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THE WILSON BULLETIN

A QUARTERLY MAGAZINE OF ORNITHOLOGY

Published by the Wilson Ornithological Club

Vol. 56 MARCH, 1944 No. 1

THE KITES OF THE GENUS ICTINIA

BY GEORGE MIKSCH SUTTON

ARE the Mississippi Kite and Plumbeous Kite distinct species, or are they geographical races of the same bird? Twenty years ago, when I first compared specimens of the two forms, I was so impressed with certain differences between them that it did not occur to me to question the judgment of those who had accorded them full specific rank. At that time I had not seen either in life, had not examined either eggs or young birds, and did not know enough about taxonomy to be concerned with the validity of such phylogenetic concepts as might be embodied in, or proclaimed by, their scientific names.

Today I am much better acquainted with these two kites. I have spent weeks on end with the former in western Oklahoma (Sutton, 1939:41–53) and have encountered the latter briefly in southwestern Tamaulipas, at the northern edge of its range (Sutton and Pettingill, 1942:8). I have handled the skins in several of our museums and am convinced that neither form has a single morphological character wholly its own. I have made a point of observing both birds critically in life, have heard their cries, noted carefully the colors of their fleshy parts, painted them from freshly killed specimens, skinned them, and examined their stomach contents. All this, together with what I have learned from the literature concerning the distribution and nesting habits of the Plumbeous Kite, convinces me that the two birds are conspecific. In the following paper I propose to show why I consider them thus closely related.

In disposition and behavior they are alike. They are mild to the point of docility much of the time though capable of becoming pugnacious when their nests or young are threatened. They may perch for an hour at a stretch in the very top of a tree but are more likely, especially on a hot day, to seek a shady spot on a lower branch. Their flight is buoyant, easy, and graceful. As they soar about, their widespread tails veer this way and that.

I have not had opportunity to compare their cries directly, but the shrill whistles of Plumbeous Kites that I heard in Tamaulipas seemed to me the precise counterpart of the *phee-phew* I had so often heard from the Mississippi Kites in Oklahoma.

Both birds feed chiefly on large insects, many of which they capture on the wing. Freshly killed specimens have the same peculiar, sweetish, slightly offensive odor, probably that of insects they have eaten. Too, they usually have a soiled patch in the middle of the under tail coverts—evidence of the habit of tucking moist, partly eaten prey snugly up against the tail as they fly.

As for their nidification, I can say nothing concerning the Plumbeous Kite from personal observation. The nest is described as "a collection of rather coarse twigs" built with "but little care" and placed thirty to forty feet up in a mangrove (Dickey and van Rossem, 1938: 108); as a "small, rather formless" structure "of sticks placed in the main crotch of a tree about twenty feet from the ground" (Chapman, 1894:70); and as "composed of small sticks . . . lined with leaves and fibrous material, and placed toward the end of a branch of a *Ceiba* at 50 to 60 feet" (Belcher and Smooker, 1934:589). It must, therefore, be very much like that of its northward ranging relative. The Mississippi Kite nests "in tall trees" (Chapman, 1932:216) when it inhabits a heavily forested region. So, apparently, does the Plumbeous Kite. Chubb (1916:274–275) quotes Schomburgk to the effect that the latter form "builds its nest of twigs in tall trees that are quite impossible to climb."

The eggs of the two forms seem to be very similar. They are white or very pale bluish white, unmarked save for nest stains. Three Plumbeous Kite eggs described by Belcher and Smooker (1934:589) measured 40 x 33, 41.25 x 35.5, and 41 x 35 mm., while the average for 29 Mississippi Kite eggs measured by Bendire (1892:179) was 41 x 34 mm. (extremes: 39 x 32—44.5 x 36.5). However, the egg of the Plumbeous Kite figured by Oates (1902: plate 14) is much more spherical than the egg of the Mississippi Kite figured by Bendire (1892: plate 5); the former is "oval," the latter, "short ovate" (Ridgway, 1886: plate 16). The Mississippi Kite lays one to three eggs, usually two. So few Plumbeous Kite nests have been discovered that it is hard to say what the average set may number. A nest reported from El Salvador held a complete set of one egg (Dickey and van Rossem, 1939:108). One nest found in Trinidad held one egg, another held two (Belcher and Smooker, 1934:589). A nest in "South Guyana" (= mainland of Brazil near the island of Maracá) held one young bird (Goeldi, 1897:150). Wolfe (1938:6) records a single egg from Brazil, and a set of two from Paraguay.

As for the natal down, I have not yet seen a specimen nor found a description of the newly hatched Plumbeous Kite, but a young one "about a week old" is said to have been "of white color" (Goeldi, 1897: 150). The newly hatched Mississippi Kite is snow white with a dull gray facial mask and a very faint wash of brown on the nape, back, and upper side of the wings (Sutton, 1939:48).

I have not had opportunity to compare skeletons of the two birds, but both have short, scutellate tarsi and rather short toes; well proportioned, pointed wings with the two outermost primaries notched; round nostrils; broad, roundish head; and compact body.

If, then, these two kites are so much alike, how do they differ? The Plumbeous Kite is darker than the Mississippi Kite, generally speaking. Its principal diagnostic marks are the white barring of the tail and the reddish brown patch on the primaries. These are usually thought to be specific characters. But are they? Let us consider all the so-called 'species characters' one by one.

1. *White barring of tail.* In adult plumage the tail of the Plumbeous Kite is always barred with white. At first glance this appears to be a strong species character, but careful examination of any large series of Mississippi Kites reveals the presence of white tail-barring (see Amer. Mus. Nat. Hist. Nos. 80643 and 470055) and gray tail-barring (see Univ. Mich. Mus. Zool. No. 57265 and G. M. Sutton No. 2315) in some breeding, and probably fully adult birds, as well as in a good many subadult birds. It is normal in birds under a year old; it is fairly common in the first breeding plumage (perhaps because of delayed molt); and its presence is evidence of morphological overlap.

2. *Red-brown wing-patch.* Most (probably all) adult Plumbeous Kites have a more or less extensive rufous patch on the primaries. Some young Plumbeous Kites also have it. But some young Plumbeous Kites do not have it, and most adult Mississippi Kites have a suggestion of it, so here again we have morphological overlap.

3. *White tipping of secondaries.* I have yet to find an adult Plumbeous Kite with white-tipped secondaries, but I have examined enough Mississippi Kites to know that some adults have little or no white tipping, and that those individuals which have the character most strongly developed also have the most extensive concealed white markings on the wing coverts and scapulars; hence I regard the concealed white markings that are occasionally found on the back and wings of the Plumbeous Kite as further evidence of morphological overlap.

4. *Shape of tail.* The tail usually is truncate in the Plumbeous Kite, furcate in the Mississippi Kite. But at least four specimens in the American Museum's series of about fifty adult Plumbeous Kites have more or less furcate tails (the character is especially marked in a male, No. 121448, collected March 13, 1913, at Villavicencio, Colombia); and some Mississippi Kites have truncate tails (see Amer. Mus. Nat. Hist. No. 470055), so there is at least occasional morphological overlap in tail-shape.

5. *Proportions of wing and tail.* In the Plumbeous Kite the tail is less than half as long as the wing. I encountered no exception to this rule in a series of 42 specimens I measured and carefully checked at the American Museum. But in one specimen (a female, No. 73597) the

tail-length was 49.7 per cent that of the wing-length, and in five other specimens it was at least 48 per cent. In the Mississippi Kite, on the other hand, the tail is said to be more than half as long as the wing, but in the American Museum's series of 13 adults there are two in which the tail-length is only 49.5 per cent that of the wing-length, and there are four others in which it is very little more than 50 per cent (50.5, 50.9, 51.4, and 51.6 per cent). In other words there is actual morphological overlap here too.

6. *Color of fleshy parts.* Adult Plumbeous Kites are much brighter footed than adult Mississippi Kites in life, but there is enough yellow, orange, or orange-red on the tarsi, and sometimes the toes, of the latter to indicate that this brightness-of-foot character also is common to the two forms. The eyes are a beautiful deep red in both. The supraorbital shield and cere are without bright color in both, though the mouth-corners sometimes have a touch of red-orange.

7. *Immature plumage.* In the immature plumage we again find a difference in intensity, the Plumbeous Kite being more sharply black and white, especially below, and sometimes having an extensive red-brown wing-patch. From above, the two forms are scarcely distinguishable in this plumage; but the Mississippi Kite has much more concealed white on the scapulars and wing coverts—a fact that becomes instantly apparent with parting or lifting of the plumage. The Mississippi Kite is less heavily streaked, and therefore whiter, on the chin; more broadly streaked throughout the breast and belly; and the streaking is brown rather than dark gray. But in this plumage, as well as in the adult, there is no character strictly peculiar to one form or the other.

At no point does the breeding range of the Plumbeous Kite touch that of the Mississippi Kite though the latter is believed to have nested as far south as the mouth of the Rio Grande within recent times (May, 1935:17). I feel certain that the Plumbeous Kite nests nowhere more than a few miles north of Gomez Farias, Tamaulipas, where our party found it in the spring of 1941, and the southern limits of the Mississippi Kite's present-day breeding range (central Texas, southern Louisiana and extreme northwestern Florida) are far to the northward of this tropical valley. In winter there may be occasional overlapping, for some Mississippi Kites move southward into the range of the other bird (Peters, 1931:201).

How did the Mississippi Kite, this northward ranging relative of the Plumbeous Kite, become isolated? Did some storm of vast proportions carry its progenitors northward en masse, transferring them to a wooded country in which they established themselves in a single season? Or did these progenitors move slowly northward, only to become isolated because the dry country of northern Tamaulipas and southern Texas proved not to be adequate to their needs? Probably not. More plausible is the guess that before the ice-age the range of *Ictinia* was continuous from Florida westward along the Gulf Coast to Mexico;

that the southward moving ice sheet separated eastern birds from western; and that since the retreating of the ice the birds of the "Florida pocket" (that is, the Mississippi Kites of today) have been gradually moving westward and southward toward the western birds (that is, the Plumbeous Kites). The present day range of many reptiles and other animals suggests that some such explanation may well be the most accurate (see Mayr, 1942:177).

The Mississippi Kite now occupies a nesting range very distinct from that of the Plumbeous Kite. There is no area in which the two forms intergrade, no area in which one "approaches" the other. Only rarely do we come upon a specimen which might actually be called the former by one systematist, the latter by another. The Mississippi Kite is, in other words, a very distinct race or subspecies. But the similarities between it and its relative to the south are far more important than the dissimilarities—this is the point of my discussion. Giving the two birds the same species name will call attention to, and accent, the closeness of their relationship. Only through 'lumping' of this sort will scientific names serve to show the kinship of United States birds with those of lands far beyond our own borders.

If the above suggestion be adopted, our Mississippi Kite may well be thought of, if not actually called, the Mississippi Plumbeous Kite. How such a name would please Audubon, for Audubon, believing that his rival, Wilson, had merely re-described Gmelin's *Falco plumbeus*, relegated *Falco misisippiensis* to the synonymy of that species!

Another race of *Ictinia plumbea* has been described—*Ictinia plumbea vagans* Miller and Griscom (1921:5); but it seems to be generally conceded that Central American birds are not sufficiently different for recognition as a distinct race (see, for example, Dickey and van Rossem, 1938:107).

The races of *Ictinia plumbea* may, therefore, be listed as follows:

Ictinia plumbea plumbea (Gmelin)
Falco plumbeus Gmelin, Syst. Nat., 1, pt. 1, 1788, p. 283 (Cayenne, ex Latham)

Ictinia plumbea misisippiensis (Wilson)
Falco misisippiensis Wilson, Amer. Ornith., 3, 1811, p. 80, pl. 25, fig. 1 (below Natchez, Mississippi)

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BONAPARTE'S GULL ON THE NIAGARA RIVER AND EASTERN LAKE ERIE

BY CLARK S. BEARDSLEE

THE Niagara River forms an important part of the fly-way of the Bonaparte's Gull (*Larus philadelphia*) on both the spring and fall migration flights. Since the river offers open water and adequate food at every season, and particularly since it acts as a bottle neck in the overland route between the Atlantic and the species' breeding grounds, it affords a rare opportunity to observe these gulls in large numbers.

My interest in the Bonaparte's Gull was aroused immediately after my moving to Buffalo in the spring of 1921, and my study of their habits during the succeeding years has brought out some points which seem worth recording. The present paper deals only with group movements, dates of molting, and variant plumages, as observable on the Niagara River and eastern Lake Erie.

March. Insofar as western New York is concerned, a calendar of the Bonaparte's Gull properly starts with the month of March. The arrival of the earliest migrants varies somewhat with the weather, but a few gulls usually appear soon after March 20, and more follow during the last days of the month. These early flocks are normally composed entirely of adults in winter plumage.

April. Early in the month Bonaparte's Gulls become abundant. These migrants are adults, and the assumption of the black hood is approximately coincident with their arrival. The dates on which winter- and nuptial-plumage birds are present in equal numbers—in other words, the dates for the height of the prenuptial molt—average April 11, the earliest being April 6 (1939) and the latest April 17 (1935). Individual birds may occasionally be found in full nuptial plumage as early as April 2. It is impossible to determine when the most tardy individuals assume the hood, for in very rare instances it is not assumed at all. In an average year, 10 per cent of the gulls will have the black hood on April 7, and 90 per cent ten days later, indicating that the complete process in the individual is a matter of a few days only, and almost certainly requires less than a week. Immature birds are uncommon throughout the month, although I have noted a slight increase in their numbers during the last week of April in several years when the weather was mild. They appear to be entirely in winter plumage at this season. No signs of molting in immatures is visible to the field observer in western New York during April, the dark feathers about the head being acquired, if at all, after the middle of May (see below).

May. Most of the adults leave our waters during the first half of May, large numbers often congregating in flocks preparatory to the flight to their breeding grounds. I have seen flocks of several thousand birds on numerous occasions during the first week of May, and once (May 3, 1930) observed a single flock of more than 10,000 adults floating down the Ontario side of the river a short distance above the falls. Coincident with the adults' departure, the immatures begin to arrive in some numbers. There are always a good many present soon after May 1, but they ordinarily do not reach their peak of abundance until the middle of the month, by which time there are generally several hundred immatures on the river. They remain here for a much shorter period than the adults. Although arriving in our waters about a month later than the older birds, they follow them northward fairly closely, and by the month's end are usually scarce.

June. Occasional adults may be encountered after June 1, but they are rare, and I have never seen one after the first week. Immatures are more often seen, but in a normal year they are not present in numbers, and after mid-month only the few individuals which summer here can be found.

July. Only summering immatures are found here during the first half of July. During the third week, the earliest adults (still in nuptial plumage) return from their breeding grounds. They are in small groups easily overlooked, but I have seen them once (1943) as early as July 15 and several times almost as early. Their numbers are gradually augmented during the remainder of the month, but I have never found as many as 100 in a flock until early August.

August. The complete postnuptial molt of the adult, all stages of which are observable here, takes place in August. After the first few days of the month, Bonaparte's Gulls are abundant on the Niagara River, particularly off Bird Island from the International Bridge up to a point opposite the northern portion of the Buffalo sewage disposal property. The immense flocks which often congregate in that area afford an ideal opportunity for estimating relative numbers of the different plumages accurately. Individual adults exhibiting signs of molt about the head[1] may be seen as early as August 5, and by August 15 the molt is usually at its height. The date for the height of the molt is somewhat variable (earliest, August 13, 1930; latest, August 20, 1940). The flocks are composed predominantly of adults, with immatures (second-year birds and juveniles) averaging perhaps 10 per cent. Sometimes in early August one encounters flocks of a thousand or more gulls, all adults; but the large mid-August flocks may contain as high as 15 per cent second-year birds and a few (maximum 5 per cent) juveniles. The second-year birds have a later and slower molt than the adults. In the course of this molt they assume adult plumage

[1] The molt starts on the forehead and chin and works back, but proceeds most rapidly over the crown.

for the first time. We therefore find that during August all of the adults and many of the second-year birds are changing to an identical plumage. For this reason the decreasing proportion of birds in immature plumage during the latter half of the month does not indicate that the second-year birds are leaving for the south. By the month's end only one or two gulls in the black-headed plumage can be found among a flock of two thousand birds, although two or three per cent still show a slight trace of the hood. Birds in immature plumage (mainly second-year birds) now compose only six or seven per cent of the total, though still present in numbers sufficient to impress the observer with the fact that their molt, as a group, is much more prolonged than that of the adults.

September. After the first of September, adults in the black-headed plumage are very rare, my latest date being September 3 (1940). By that time about two per cent of the gulls still exhibit signs of incomplete molt, and about five per cent are in immature plumage. This five per cent diminishes gradually throughout the month as the molt proceeds. During September Bonaparte's Gulls are more locally concentrated than at other seasons of the year. They feed almost exclusively off Bird Island and in a number of favored haunts along the Canadian shores of Lake Erie and the upper Niagara River. Usually hundreds or even thousands may be found in each of these areas, whereas on many trips to Dunkirk, Erie (Pennsylvania), and Niagara Falls during September I have seen not a single individual, or only one or two very small groups. I have found several hundred birds present at the Falls and at Dunkirk in September, but only rarely. A considerable number of the gulls leave late in the month.

October. Bonaparte's Gulls are less common throughout October than they are in either the preceding or the succeeding months. It is actually unusual to find any at Niagara Falls, and even at Bird Island their numbers are much reduced. In 1933 there were never more than three or four individuals off Bird Island during the entire month. Admittedly 1933 was abnormal, but even during an average October the flocks of Bonaparte's Gulls encountered on the upper Niagara River, from Buffalo to the Falls, are comparatively small. They are composed mainly of adults, but a few birds in immature plumage can usually be noted. Since a bird of the previous year that has not yet molted, and a bird of the year that has assumed the first winter plumage, are practically identical in appearance, it is difficult in the fall to recognize and classify the immatures. I believe, however, that any bird of the previous year has assumed adult plumage by the first of October. This seems reasonable, for whereas their molt is more extended than that of the adult, it may be expected to be complete one month after the adults have all molted. Acting on this assumption, I conclude that the few immatures which are present after October 1 are birds of the year. Their numbers are very small.

November. The second phase of the fall migration occurs in November, the date of its maximum intensity varying with the weather. In general it takes the form of a southward drift which gradually augments the population already present. I have found flocks of a thousand or more in some years as early as November 10, any period of subnormal temperature during the month seeming to bring a few hundred more individuals southward. This November movement is, however, subject to considerable variation from year to year, and some years there appears to be no concentration at any time during the month. An example was the year 1933. In fourteen days of observing during November of that year, the largest number seen was 150, found off Bird Island on November 13. On November 10 and 17, however, I saw only two individuals there; on five trips down the river to Niagara Falls I saw Bonaparte's Gulls only twice, and ten was the maximum observed. November is the best time to look for birds of the year. As stated above, a very few usually appear in August, but if there is any concentration of them at all, it occurs during the first half of November. Even at this season their numbers are not large. Such a flock as I saw November 3, 1941, containing 150 gulls, of which 125 were birds of the year, is very unusual. That particular flock grew to a total of 800 birds by November 10 and 11, and then contained 160 birds of the year, the largest number I ever saw in the fall. The young birds do not tarry long. After November 20 it is difficult to find more than one or two in even the largest flocks, which are now over 99 per cent adults. When we consider that many thousands of Bonaparte's Gulls use the Niagara River as part of their migration route in the fall, the scarcity of juveniles is striking. I estimate that more than 15,000 adults and second-year birds pass through here each fall, yet I seriously doubt that juveniles have ever been represented by as many as three per cent of that number in any one of the more than twenty years during which I have studied them. An interesting conclusion emerges: the juveniles migrate southward over a different route.

December. This is the month of the third phase of the fall migration, which begins with the advent of severe cold weather. Usually the first cold snap occurs between the first and tenth of December, and brings the gulls to the Niagara frontier in flocks of several thousand birds. If the cold spell is of short duration, many of the gulls linger for a time, and considerable numbers are here at Christmas, or even later. If the period of cold is prolonged, however, the gulls continue southward. In 1940, near zero temperature was recorded on December 1, and on December 2 and 3 there were 2,000 gulls off Bird Island. On December 4 the extreme cold showed no sign of abating, and had covered the canal behind Bird Island with ice. On that day not a Bonaparte's Gull was to be found on the upper river. As the cold continued, I observed 100 gulls at Niagara Falls on December 5, and on the following day, 80 were off Bird Island. This number was increased

to 200 by December 10, but even though higher temperatures prevailed, the flocks thereafter were small and scattered. It is always both interesting and instructive to study the effect of December weather on the gull population, but just as a thirty-day period of weather never duplicates itself, so the size of the gull population is variable from year to year. The December flocks are normally composed entirely of adults, but an occasional immature may be noted.

January. Usually Bonaparte's Gulls are entirely absent during most or all of January. Often a few linger into the early days of the month; less frequently large numbers are still present (for example, a flock of 1,600 was observed January 1, 1931, at Bridgeburg, Ontario). Generally it is difficult or impossible to locate any Bonaparte's Gulls here after the first week of January. In 1931, I found 30 along the Canadian shore of the river on January 22, and in 1932 and 1937, they were here throughout the month, 200 being counted January 31, 1937, on a trip along the Canadian shore of Lake Erie as far as Port Colborne. Normally these January flocks are composed entirely of adult birds. In the exceptionally mild winter of 1932, however, there were not only large flocks present (1000, for example, on January 22 at Dunkirk), but each flock contained several immature birds.

February. In only two years have I seen Bonaparte's Gulls here in the month of February: in 1937, when I observed a few on February 1 and 2; and in the mild winter of 1932, when groups of from 60 to 350 were present at various points from Dunkirk to Niagara Falls, not only through February, but also throughout March until the spring migrants arrived.

Notes on Plumage

Bonaparte's Gulls reach maturity more quickly than the Herring (*Larus argentatus*) and Ring-billed (*L. delawarensis*) Gulls,[2] which are also abundant here. Furthermore, there is less variation in plumage between individuals of the same age group. Certain differences can be noted, however.

1. First nuptial plumage. Dwight stated (1901:57) that in the first prenuptial molt "the deep plumbeous hood is partly, and probably in many birds fully acquired," and later (1925:308): "an imperfect cap of dull grayish black is assumed, sometimes more advanced." This suggests that these gulls in their first nuptial plumage always exhibit at least a partial hood. But in the field, where an observer can examine over a period of years thousands of young gulls in spring, I believe that the individual with even a partial hood will be found to be exceptional. Immatures displaying the full hood are rare—I have seen only two. Regarding the time of molt, Dwight stated that the first prenuptial molt takes place "during March and April on the Atlantic

[2] Herring Gulls have a four-year plumage cycle, Ring-billed Gulls a three-year cycle, Bonaparte's Gulls a two-year cycle (Dwight, 1920:268).

coast" (1901:57), "late winter" (1920:266), and "April and May" (1925:308). As stated above, I have seen no signs of molting in immatures until May.

2. Winter plumage. After the postnuptial molt, band-headed individuals are rather common. In these birds the usual winter dress is modified by a band of gray extending up over the top of the head from eye to eye, usually accompanied by a similar streak joining the dark ear patches. The intensity of these bands varies greatly, from faint gray to a gray so dark that it appears black, but even when faint, the posterior band is quite noticeable when the bird is facing away from the observer. On November 10, 1941, I observed a bird of the year with both bands present, though rather faint, and with the entire back of the neck brownish-gray. This latter is a vestige of the juvenal plumage. Band-headed individuals may be found among both adults and immatures in their winter plumage. When seen in early April it might be mistakenly supposed to be an indication of the incidence of the prenuptial molt, but I have observed this plumage not only through early winter, but also on March 4, 1932 (in both adults and immatures).

Summary

A study was made of the group movements, dates of molting, and variant plumages of Bonaparte's Gulls on the Niagara River and eastern Lake Erie from the spring of 1921 to 1943.

The adults arrive in late March and early April, leave during May, return in late July and August, and depart in September, October, and November.

The young of the previous year arrive in May, drift northward in late May and early June, and probably compose a large portion of the great November and December flocks.

Juveniles are surprisingly rare in fall, and it seems necessary to conclude that they follow a different route southward.

Dates of prenuptial and postnuptial molts are given.

The band-headed plumage of adults and immatures is described.

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THE PRESENT STATUS OF THE AMERICAN EIDER ON THE MAINE COAST*

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THE long, irregular coast line of Maine, with its numerous bays, coves, and harbors, is dotted with islands. There are more than 400 that range in size from 1,100 to 16,000 acres (H. E. Dunnack, 1920:39); more than 1,300 smaller islands that support a substantial growth of trees and vegetation; and so many islets and ledges that no one has ever attempted to count them. Numbers of sea birds have taken advantage of the excellent nesting sites and the isolation provided by many of the islands, especially those that lie well out to sea.

Figure 1. A group of adult American Eiders: five males (two in nuptial plumage), and four females. Kent Island, New Brunswick, June 17, 1932.

In recent years sea birds have greatly increased in numbers along the Maine coast. Some, like the Double-crested Cormorant (*Phalacrocorax auritus auritus*) and the Great Black-backed Gull (*Larus marinus*), have also greatly extended their ranges, and the Herring Gull (*Larus argentatus smithsonianus*), which, at the turn of the century, was threatened with extermination as a breeding bird on the Maine coast, has increased with protection to such an extent that the U. S. Fish and Wildlife Service has been forced to undertake measures of

* Contribution Number 10, Bowdoin-Kent Island Scientific Station, Kent Island, Bay of Fundy, New Brunswick, Canada.

control. The Black-backed Gull is becoming so abundant and is so destructive to the eggs and young of other sea birds, especially to those of the Eider, that similar control may prove advisable.

This paper will deal primarily with the American Eider (*Somateria mollissima dresseri*), which, like the Herring Gull, was at a very low ebb of its existence on our coast 40 years ago, when William Dutcher (1904:147) wrote: "The American Eider . . . . is yearly becoming more rare owing to the fact that almost every set of eggs that is laid is at once taken by some fisherman." Dutcher (p. 152) also quotes Arthur H. Norton: "Though this bird [the Eider], within the memory of the present generation . . . . bred from the western side of Penobscot Bay . . . . east to Machias Bay, it is now reduced to the small number breeding in Jericho Bay and a colony on Old Man Island." A year later Norton wrote of the Eider: "Maine is the only state in the Union in which it breeds, and while twenty-five years ago it occupied no less than fifteen of our islands and ledges to breed upon, it has been gradually reduced to the very verge of disappearance as a breeding bird"; and in 1907: "There are probably no Eiders breeding on the coast of Maine, except those at Old Man's Island" (Norton, 1905:78; 1907:325).

The year 1907 marks the low point for this species along the Maine coast. When Old Man Island was leased to the National Association of Audubon Societies (now the National Audubon Society), and Fred E. Small appointed warden in 1907, Small reported that there were only "two Eider Ducks breeding" on the island (Bowdish, 1909:124). But through the foresight of the National Audubon Society, the Eider was able to re-establish itself. By 1910 there was a substantial increase in the number of Eiders breeding on Old Man Island. From there they spread southwestward, and by 1911 Swain (1911:58) found a dozen nests on islands near Isle Au Haut, and in 1915 A. H. Norton (1915:501) reported that Eiders were again breeding on the islands in Jericho Bay.

Norton and Allen (1931:591) in their thorough inspection of the sea bird colonies on the Maine coast from June 23 to July 14, 1931, reported counting 165 adults, 25 broods, and 27 nests. In an unpublished report submitted to the National Audubon Society, they list Old Man Island, White Ledge, West Penobscot Egg Rock, Mouse Island, Robinson's Rock, and Calderwood Island as Eider nesting localities (see also Berolzheimer, 1932:21). Thus the Eiders slowly increased their numbers and regained much of their former nesting area in the course of 25 years.

During the past three years (1941–1943) I have visited the more important sea bird colonies as a Collaborator serving with the U. S. Fish and Wildlife Service,[1] and have supplemented these trips with

[1] I wish to thank the officials of the Fish and Wildlife Service for the opportunity offered to record the increase and present distribution of the Eider and other sea birds.

independent visits to other islands. The chief objective of the Fish and Wildlife Service representatives was to visit the larger Herring Gull colonies for the control of that species; hence visits to Eider Duck colonies were incidental. However, the records are sufficient to indicate the present trend of the population and the fact that the Eider is again firmly established as a breeding bird on the coast of Maine. Each year the trips were taken during the last two weeks of May and the first three weeks of June and extended from the Isles of Shoals, near the Maine-New Hampshire state boundary to the most northeastern sections of the Maine coast. I have found Eider nests on 31 islands, and I saw adult Eiders in the vicinity of 14 others, where they were probably nesting but where the duties of the gull control project did not permit time to land.

The nesting range has now extended as far southwestward as Mark Island in Casco Bay, and a summering pair has been recorded as far south as Massachusetts (Walsh, 1933:93). The large flocks of Eiders, some of them containing two or three hundred individuals, seen all the way from the mouth of the Kennebeck River to the Bay of Fundy, are

Figure 2. Female American Eider on nest. Kent Island, New Brunswick. June 24, 1932.

another indication of the increasing abundance of this splendid sea duck. The present population of nesting Eiders on the Maine coast probably exceeds 2,000 pairs, as contrasted with the two birds known to be breeding there in 1907.

The comeback of the Eider is apparently due to several factors: first, the protection and educational program initiated by the National Audubon Society; second, the law prohibiting spring shooting; and third, the recent pronounced decrease in egg collecting. The third, a development due to the war, is perhaps the most important. The armed services and various war industries have taken many of the persons who, in spite of the laws prohibiting it, frequently visited the islands to gather Eider eggs, which are highly prized as food (Knight, 1895:388).

The increase in Eiders is not peculiar to the coast of Maine but has been noted in other sections of the breeding range, for example, on the islands in the Bay of Fundy, New Brunswick—notably on Kent Island, the site of the Bowdoin Scientific Station. Brownson (1908:75) reported that there were only about a dozen pairs of Eider Ducks breeding at Three Islands (a group of which Kent Island is a member). With protection the colony on Kent Island had increased to 300 pairs by 1937 (Gross, 1938). By the summer of 1943, the Eiders had invaded every part of the two-mile island, and according to the warden, Ernest Joy, there are now a thousand pairs nesting there. This island presents a splendid example of what may be accomplished by establishing guarded reservations. From this Eider metropolis the Eiders have invaded many of the islands of the Grand Manan archipelago.

Space does not permit giving an account of each of the 31 Maine islands where Eiders were found nesting, but 9 of them have been selected because of their larger population, because of their geographical location, or because they represent typical conditions and trends of the present day Eider population. A complete list of the 31 islands is given at the end of this paper.

Most of the islands inhabited by the Eiders are very small, some of them only a few acres in area. Most of them are occupied by other sea birds, such as gulls, cormorants and guillemots. None is inhabited by man.

Old Man Island. 44° 37.2′ N., 67° 14.2′ W.

Old Man Island, the most northeastern of our sea bird colonies, is located three miles southwest of Cutler, and overlooks Grand Manan Channel to the east. It is a high rugged island, about 12 acres in area, with precipitous rocky shores. It is divided into several parts by deep straight-walled chasms. The top is covered with a reddish-brown peaty soil which 20 years ago supported a large number of spruce trees. Today most of these are dead; some are still standing, but the majority have been blown down by the storms of recent years and form a tangled network of stumps, fallen trunks and broken limbs. In the open spaces

there are luxuriant growths of grass, weeds, vines, wild parsnips, and other plants, which provide concealed nesting sites for the Eiders.

In 1907, as previously stated, there were but two Eiders nesting on the island, which were the only nesting birds of this species known on the coast of Maine at that time. Early in June, 1913, Frank A. Brown (1913:217) found a nest with one egg. On July 24 and 25, 1931, Allen and Norton (MS) found four nests with three to four eggs each. When we visited the island on June 6, 1943, we counted 83 adults

Figure 3. Nest of American Eider. Grass Ledge, Maine. June 8, 1941.

swimming around the island. In the course of the gull-control work nine nests were discovered: one with three eggs; four with four eggs each; three with five eggs each; and one empty. All of these nests were located among the grass and weeds of the open spaces, and I have no doubt a greater number were hidden in the tangle of fallen spruces. Judging from the number of adults seen, there are probably 25 pairs breeding there today. The Eiders are now well established on the island in spite of the fact that it also has a large nesting population of Cormorants and Herring Gulls and eight pairs of Black-backed Gulls.

In going along the coast from Old Man Island to the southwestward we saw flock after flock of Eiders, many of them comprising more than

50, and a few more than 200, individuals. We also found the birds nesting on six islands between Old Man Island and Penobscot Bay. A systematic search would probably reveal many more nesting Eiders along this stretch of coast line, which is dotted with hundreds of islands.

Grass Ledge. 44° 13.1′ N., 68° 51′ W.

A most significant fact concerning the present status of the Eider Duck is the large number which are again breeding on the numerous islands of the Penobscot Bay region. I have visited 23 islands in the bay (Matinicus, Vinal Haven, Castine and Rockland quadrangles) which are now occupied by nesting Eiders. Of these, Grass Ledge has the largest number of nesting birds. It is located in upper Penobscot Bay about 2½ miles north of North Haven and midway between Compass and Scrag islands. It should not be confused with another Grass Ledge (also inhabited by Eiders) lying 3 miles to the southeastward, in the same quadrangle. The Grass Ledge under consideration is two islets separated, except at very low tides, by a narrow channel. It has the rocky shore line characteristic of all of the islands of this region. The central portion of the northern and larger member is comparatively level and is thickly covered with grass, weeds, and other herbaceous plants. There are no trees or shrubs, and there is little to commend it as a nesting place; yet in recent years its few acres have provided a breeding ground for one of the largest colonies of Eiders on the Maine coast. There are more nests per acre here than in any of the numerous colonies I have visited in the Maritime Provinces or on the Labrador coast.

Allen and Norton (MS) made no mention of Eiders nesting on Grass Ledge when they visited this region in 1931, and I have discovered no published record of Eiders nesting there in recent times prior to my visit in 1933. I was informed by fishermen, however, that the birds were breeding there in 1932. When I arrived June 7, 1933, there was already a well-established colony of 94 nests, of which 72 contained one to six eggs and one contained four young. Young had left 14 nests, and in 7 nests the eggs had been broken and the contents eaten—probably by the Black-backed Gulls which were also nesting on the island. From one point on the island I counted 80 female and 12 male Eiders in nuptial plumage. There were also 13 females with broods comprising a total of 55 young, ranging from downy young just out of the nest to others about a week or 10 days old.

When he visited the island in July, 1936, Bryan W. Barker (1941: 65) found that all of the young had hatched—only traces of down remained to indicate the nests; on May 30, 1941, he found 45 nests with one to eight eggs each. When I visited the island on June 8 of the same year I found a total of 89 nests, of which 62 contained one to eight eggs each. Young had left 19 nests, and in 8 nests the eggs were broken and the contents eaten.

I saw 63 adults, 56 females and 7 males, swimming near the island. There were also 3 females, with 12 young in their combined broods. We found two dead adult Eiders, but there was nothing to indicate the cause of their death. A pair of Herring Gulls and two pairs of Black-backed Gulls were nesting on the island, and as we approached we noted four Crows (*Corvus brachyrhynchos*) that may have been responsible in part for the broken eggs found in eight of the nests. The gull nests were destroyed by Mr. White, the Federal warden, to discourage these birds from nesting on the island.

On June 10, 1942, we arrived at a time when the eggs in seven nests had just hatched or were in process of hatching. There were 86 nests with one to seven eggs each, and 27 empty nests. We found six dead adult Eiders with their flesh eaten away, possibly by a mink. As in previous years, a pair of Black-backed Gulls were nesting on the island. The Federal warden destroyed the nest and killed the three young that it contained.

On June 3, 1943, just a week earlier in the season than our visit of the previous year, we found 123 nests: 115 contained one to six eggs each; one nest was empty; young had left one nest; and in six nests the eggs had been punctured and partially eaten—probably by gulls, since we saw neither Crows nor Ravens on this island during our 1942 and 1943 visits. In spite of the efforts of previous years to discourage the Black-backed Gulls from nesting on Grass Ledge there were two of their nests, containing three young each. The warden took more drastic action this year, and not only destroyed their nests and young but also shot three of the adults because there is little room for competition on this little islet already over-crowded with nesting Eiders.

The ten-year history of the Eider colony on Grass Ledge shows a very slow but steady increase from 94 nests in 1933 to 123 nests in 1943. Undoubtedly many of the Eiders reared on Grass Ledge have served to stock some of the neighboring islands.

Compass Island. 44° 12.9′ N., 68° 52′ W.

Compass Island is also in upper Penobscot Bay, less than a mile southwest of Grass Ledge. It has an area of about 20 acres, and the eastern part is covered with a number of large spruces, oaks, birches, and other hardwood trees which provide nesting sites for two pairs of Ravens (*Corvus corax*) and a pair of Ospreys (*Pandion haliaetus*). Bordering the growth of large trees is a thick tangle of shrubs and briar thickets. About three fourths of the area of the island is covered with grass, which supports a flock of about 20 sheep and provides nesting sites for 800 Herring Gulls and 18 pairs of Black-backed Gulls. The Eiders nest in the thicker, taller grass and briar patches, and among the shrubbery and spruces.

The first record I have of Eiders nesting on Compass Island is June 8, 1941, when we found five nests containing two to five eggs each.

Swimming near the shore were 3 females with a total of 11 young that appeared to be about 10 days old.

The next year, on June 10, 1942, there were two nests with four eggs each and two nests with five eggs each; young had left three nests, and the eggs had been punctured or broken in four nests—probably by the Ravens and Black-backed Gulls. We found two gull nests which contained Eider eggs. One contained three gull eggs and one Eider egg, and the other, two gull eggs and two Eider eggs. The eggs in the two gull nests were being incubated by Eider females. The occurrence of Eider eggs in gull nests is not rare and may be expected on any island where the two species are nesting in proximity. Often it is the Eider that takes possession of the nest and incubates the eggs, though on Kent Island, New Brunswick, there were cases in which the gull retained possession of the nest after the Eider eggs were deposited (Gross, 1938: 390; see also Barker, 1938:137). In addition to the nests, we noted two broods of young in the water off the island.

On June 3, 1943, we found a greater population of Eiders, but unfortunately there was even a larger percentage of nests in which the eggs had been wholly or partially eaten. There were also the bones of three adult Eiders.

In 1943 we found 40 nests: 13 contained two to five eggs each, and one contained four young; young had left three nests, and in 22 nests the eggs were punctured or broken. There was one Herring Gull nest with two Eider eggs and two Gull eggs. Eiders have increased greatly on this island during the past three years. However, the destruction of the eggs in so many nests does not make one feel optimistic for the future of the Compass Island colony. On no other island we visited on the Maine coast was there such a wholesale destruction of Eider eggs.

Downfall Island. 44° 10.9′ N., 68° 48.5′ W.

Downfall is a small island lying east of the northern part of North Haven. In this vicinity Sheep, Dagger, Burnt, Oak, Grass Ledge, Spoon, and Sloop islands also have their quotas of nesting Eiders. Most of these islands had a few nesting Eiders when I first visited the region in the years 1933 and 1934. All of them have maintained, and some have greatly increased their numbers of nesting birds, especially during the past three years.

Downfall, though smaller than the others, has been selected as a good example of an average-sized Eider colony, and the increase in its Eider population during the past three years is typical of the recent trend on the majority of the Eider islands. It is without trees or shrubs, but there are numerous patches of tall grass, luxuriant weeds, and umbelliferous plants. In addition to the Eiders there are a colony of about 200 Herring Gulls, 5 pairs of Black-backed Gulls, and an Osprey, which nests each year on one of the protruding headlands. The results of the

nest counts made during the first part of June of each of the past three years are presented in the following table.

NESTS OF THE EIDER DUCK ON DOWNFALL ISLAND

	1941 June 8	1942 June 10	1943 June 3
Nests with eggs (1 to 7*)	7	23	37
Nests with young	1	3	1
Empty nests	1	-	1
Nests with eggs destroyed	-	-	5
Gull nests with Eider eggs	-	-	2
Total	9	26	46

* One nest found in 1942 contained the exceptionally large number of nine eggs, probably laid by two females.

As the Eiders increased in numbers their nesting sites approached more closely those of the gulls, and in 1943 this resulted in five nests being destroyed by the gulls. In the same year two gull nests were found to contain Eider eggs.

Barred and Colt Head Islands, 44° 16′ N., 68° 50′ W.

Barred Island and nearby Colt Head Island are north of the Penobscot Bay Islands previously mentioned. They are situated about four miles east of Dark Harbor, South Islesboro Island (which separates East and West Penobscot Bays). There are two parts to Barred Island; on the western and larger section there is a thick growth of spruce, but the greater part of its area is grown up in a tangled mass of gooseberry, raspberry, and rose bushes and briars interspersed with small areas of rank weeks and grass. These conditions provide excellent, well-protected nesting sites for the Eiders. When we visited Barred Island for the first time, on June 8, 1941, we saw 25 Eiders swimming offshore, and on the island we found two nests with five eggs each. One of the nests was located in the briars, and the other was concealed under the lower spreading branches of a large spruce tree.

On June 9, 1942, we located nine nests: three with three eggs each; two with four eggs each, and four with five eggs each. On June 3, 1943, as we approached the island, we saw 50 Eiders, one third of them males. In the thick growth of briars we found 13 nests, all of them in good condition. One of the nests contained three eggs; five had four eggs each; five had five eggs each; one had six eggs and one had seven eggs. The type of nesting cover gives excellent protection from enemies such as Ravens, Crows, and Black-backed Gulls, all of which nest on or near the island. The nests are so well concealed that all we found were located only by flushing the incubating females as we walked through the tangle of briars. Because of the large number of adults seen in the vicinity, it is probable that a systematic search of Barred Island would reveal double the number of nests we found.

On nearby Colt Head Island we found one nest in 1941, 7 nests with eggs in 1942, and 13 nests (with two to five eggs each) in 1943.

Fisherman's Island. 44° 2.4′ N., 69° 2.4′ W.

Fisherman's Island is located on the western side of Penobscot Bay about 3½ miles south of Owl's Head Light, which marks the entrance to Rockland Harbor, and 3 miles east of Ash Point. It is a rather high island with knolls well covered with grass, and the lower depressions grown up with patches of weeds and red raspberry vines. There are no trees or shrubs.

There were no Eiders nesting on Fisherman's Island when I visited it in 1935. Our first record of nesting Eiders was made on June 8, 1941, when we found one nest containing four eggs, and one nest with one egg and four freshly hatched young.

On June 1, 1943, we found seven nests: one with two eggs; one with three eggs; one with four eggs; and four with five eggs each. There were 28 adult Eiders, including 13 males, swimming along the eastern shore; and on the opposite side, one male and five females. Some of the nests were in rather open situations, and it is remarkable that, though there is a large colony of Herring Gulls and 25 pairs of Black-backed Gulls on the island, not a nest had been disturbed.

This is another illustration of how the habits of a species such as the Black-backed Gull may vary among the individuals of different island populations. There is also a prosperous colony of 265 pairs of Double-crested Cormorants nesting on the rocky outcroppings of the higher portion of the island.

No Man's Land. 43° 53′ N., 68° 52.2′ W.

No Man's Land Island is a member of the Matinicus group off Penobscot Bay. It is a fairly large island with many bold outcroppings of rock. Fallen spruce trees produce conditions somewhat resembling those on Old Man Island. In the lower levels between the rocks there are thick growths of grass and weeds.

On June 14, 1941, four adult Eiders were seen in the vicinity of the island, but no nests were discovered that year. On June 8, 1942, there were four nests: two with four eggs, and two with five eggs, each.

On June 11, 1943, we found 15 nests. Twelve contained three to five eggs each; one nest had five freshly hatched young and one egg; and there were two gull nests with Eider eggs. One gull nest contained an Eider egg and a gull egg, the other two Eider eggs and one gull egg. We saw 12 adults, including 4 males, swimming near shore.

Mark Island. 43° 42.4′ N., 69° 54′ W.

During the past three years, especially during 1943, many flocks of Eiders were seen among the islands along the coast southwest of Penobscot Bay. There were indications that they were nesting in the

Breeding Localities of the Eider Duck on the Maine Coast, 1941–1943*

QUADRANGLE	ISLAND	LOCATION
Cutler		
	Old Man Island	44° 37.2′ N., 67° 14.2′ W.
Machias		
	Double Shot Island	44° 36.5′ N., 67° 16′ W.
	Green Island	44° 33.8′ N., 67° 26.8′ W.
Columbia Falls		
	Ballast Island	44° 33.7′ N., 67° 33.2′ W.
Deer Isle		
	Shabby Island	44° 10′ N., 68° 33.5′ W.
	Great Spoon Island	44° 2.5′ N., 68° 33.5′ W.
	Little Spoon Island	44° 2.5′ N., 68° 34.4′ W.
Castine		
	Green Ledge	44° 17.5′ N., 68° 49.7′ W.
	Barred Island	44° 16′ N., 68° 50′ W.
	Colt Head Island	44° 15.6′ N., 68° 50.5′ W.
Vinal Haven		
	Horse Head Island	44° 15′ N., 68° 51′ W.
	Grass Ledge	44° 13.1′ N., 68° 51′ W.
	Compass Island	44° 12.9′ N., 68° 52′ W.
	Sloop Island	44° 12.4′ N., 68° 48.9′ W.
	Spoon Ledge	44° 12.1′ N., 68° 49.6′ W.
	Mouse Island	44° 12′ N., 68° 56.5′ W.
	Grass Ledge	44° 11.8′ N., 68° 47.8′ W.
	Oak Island	44° 11.8′ N., 68° 49.2′ W.
	Burnt Island	44° 11.3′ N., 68° 49′ W.
	Goose Island	44° 11.1′ N., 68° 57′ W.
	East Goose Rock	44° 11′ N., 68° 58.7′ W.
	Dagger Island	44° 11′ N., 68° 48.3′ W.
	Downfall Island	44° 10.9′ N., 68° 48.5′ W.
	Sheep Island	44° 10.8′ N., 68° 47.8′ W.
	Robinson's Rock	44° 9.6′ N., 68° 58.6′ W.
	Widow's Island	44° 7.8′ N., 68° 49.9′ W.
	Otter Island	44° 0.5′ N., 68° 48′ W.
Matinicus		
	No Man's Land Island	43° 53′ N., 68° 52.2′ W.
Rockland		
	Fisherman's Island	44° 2.4′ N., 69° 2.4′ W.
	Otter Island	44° 1.4′ N., 69° 4.2′ W.
Small Point		
	Mark Island	43° 42.4′ N., 69° 54′ W.

* Arranged in order, beginning with the most northeasterly and proceeding southwestward, according to the quadrangles or sheets of the U. S. Geological Survey. The nine islands discussed in the text are in boldface.

region (in particular on some of the islands of Tenant's Harbor and Muscongus Bay), though we found no nesting Eiders on the islands we visited. The probability that the Eiders have now extended their nesting range to this region was greatly strengthened by the finding of an Eider's nest on Mark Island even further to the westward, in Casco Bay.

Mark Island is one of the outer islands in the eastern part of the bay. The interior of the island is heavily timbered with spruces and hardwoods—chiefly beeches and maples. There is a colony of about a hundred pairs of Black-crowned Night Herons (*Nycticorax nycticorax*

hoactli), and a considerable number of nests of the Great Blue Heron (*Ardea herodias herodias*). About 200 Herring Gulls nest on the rim of the island between the timber and the rocky shores.

I was unable to go to Mark Island in 1943, but Jay Gashwiler of the U. S. Fish and Wildlife Service and his assistant, Allen Morgan, found an Eider's nest with four eggs when they visited the island on June 14, 1943. The nest was located on the southwestern quarter of the island about 75 feet from the water. It was well concealed in some shrubbery at the edge of the timber, and there were no gulls nesting near it. No other Eiders were seen on Mark Island nor were any others seen in Casco Bay.

This nest constitutes not only the first record of the Eider nesting on Mark Island but, as far as I have been able to determine, also the most southwestern record of nesting Eiders on the Atlantic coast.

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A STUDY OF THE CARDINAL IN TENNESSEE [1]

BY AMELIA R. LASKEY

DURING the years 1931 to 1943 I made a study of the Cardinal (*Richmondena cardinalis*) in the Nashville, Tennessee area, banding a total of 1,621 birds, and gathering data on habits through the year, nesting, seasonal movements, weights, longevity, and abnormalities. A number of individuals were color-banded, and detailed observations made on two distinctively banded pairs.

Song

The first songs of immature Cardinals are very soft warblings, totally unlike adult song: these "indefinite" warblings are called "ancestral," "primitive," or "tribal" by various authorities (Nice, 1943:42). I have records for four young Cardinals singing in August, two wild birds and two hand-raised, free-flying females. One of the latter began warbling at three weeks of age, the other at four weeks. One of the wild birds (probably a female) appeared to be about a month old; the other, a male nearly two months old, used some adult phrases in his lengthy warbling performance. "Reddie," one of the hand-raised females, added two adult songs to her warbling in early October, when she was slightly over two months old (Laskey, 1937:68). By late January and February her songs were indistinguishable from those of adults.

Jesse M. Shaver gave me the following notes on the song of the adult: "Cardinals have a great many songs, at least 16 common ones. There is a good deal of difference in the singing of individual male Cardinals. There are times when the female seems to sing more softly than the male [See Ganier, 1941:1], but this is not always or even usually the case. I think it would be wise to say that there is no more difference between the song of the male and the female than between different males. The female begins her song much later in spring than is the case with the male. After nesting begins, her song is quite different from that of the male and is often uttered on the nest. Always the male comes to her after the song and often feeds her. The female also sings when she wishes copulation to take place. The male responds to this song by appearing and copulating with her. At other times the female sings and the male sings in answer but the male does not appear."

In 1942, from June 28 through most of July, I kept a record of songs and variations heard from Cardinals about my home and in Warner Parks, using phonetic syllables to designate each song as it sounded to me. There were 28 different songs of two to six syllables each.

[1] To Mrs. Margaret M. Nice and to J. Van Tyne, I wish to express appreciation for their suggestions and editing during the preparation of this material.

The songs of the two sexes seem to me to be alike, but the male's singing season is longer than that of the female. In Tennessee, his clear ringing whistles are heard in January and February, sometimes when snow is still on the ground, whereas female song usually starts in March, when Cardinal song is heard on all sides. "Reddie" sang in December and January, but she spent much of her time indoors during the cold weather, which apparently advanced her singing period to some extent. Shaver and Roberts (1933:118) mention a female that sang in mid-February while she was being courted. There is considerable singing during July and August, when the bird is so well concealed in the foliage that sex identification is difficult. But in most cases where identification was certain, the singers were males. In August, 1943, a female sang a few songs as she perched in a tree near her nest, which at that time contained two young, eight days old. Although I have records of Cardinal song for every month of the year in Tennessee, there are very few for November and December—in some years I heard no Cardinal singing at all during these months. In Oklahoma, Nice (1927:103) found the Cardinal's season of full song began in early February and extended to late July.

Adult birds may sing an almost inaudible song ("whisper" singing) during the months of courtship and mating, January to April. This type of song is mentioned by Shaver and Roberts (1933:118) as part of courtship behavior in January and in April. In February (Laskey, 1935:1), as a mated pair investigated nest sites outside our windows, I heard very soft songs, described in my notes as "woit-woit," "de-ar," and "almost inaudible trills." Nice (1927:101) heard the whisper song in September.

There is considerable antiphonal singing between a pair during courtship as well as during nesting. At my home a male sang from a tree, and the female answered, as she incubated or brooded in the nest 150 feet away. Apparently the songs were signals between the pair, for her songs often preceded a flight from the nest to meet the male 15 or more feet away, where he fed her.

During April, May, June, and July, I have heard Cardinal songs in the night (Laskey, 1935:2). They have never been lengthy, like the night performance of the Mockingbird, but merely a few repetitions of "tu-er" or similar sounds heard in the daytime repertory. Because Cardinals like to roost about the house or garage, usually on service wires under eaves, in porches, or in foundation shrub plantings, it is particularly easy to hear these short songs on many successive nights.

Shaver and Roberts (1933:118) described song and courtship of a pair of Cardinals (involving the female cited above), which sang against each other from mid-February until nesting time, the male repeating songs after the female, changing usually as she did, often singing in unison with her. This the authors consider part of courtship, with "protective value for the territory in warning other Cardinals that it was

occupied." They describe the type of behavior common in March and April, when singing in both sexes is accompanied by swaying of the body with neck elongated and crest raised. Another courtship ceremony is sometimes followed by coition. "The male . . . with his crest, neck and body extended and singing very rapidly . . . may step sideways down the limb to the female. During this time he appears fairly to slide down. Arriving at the female, he may put some food into her mouth" (p. 119). Song was a "queer gurgling attempt" as the male flew after the female following one such ceremony. When coition followed, the female then sang a "weird" song as she walked sideways down a limb and away from the male (April 24). This pair had a nest soon afterward and the first egg was laid May 2.

Territory and Dominance

Courtship pursuits begin soon after the reappearance of full song early in the year. On mild sunny days of late February, there is considerable evidence of the beginning of territorial activity. Males sing from rather high perches in trees about a hundred yards apart. There are many pursuits at low elevations when males pursue males, and females fly after females. Sometimes three males fly in single file, but usually only two individuals of a sex are involved in these rather leisurely flights.

The groups and loose flocks, formed during fall and winter, disband gradually as males choose territory and obtain mates. (Generally these groups have been fairly even in sex ratio, but occasionally the proportion of males is somewhat greater; in December, 1943, the flock at my home had an unusually large proportion of males, 10 to 2; February 1, there were 6 of each sex in the flock.) Occasionally a mixed group may still be found feeding together in mid-March, but by late March, most of them are settled on territories with only occasional intrusions by unmated individuals.

Cardinals do not defend territory so pugnaciously as Mockingbirds, for example, do, but there is some mild fighting in spring. A mated male will fly at an intruder of his own sex; a mated female will chase another female, but each is usually tolerant of the opposite sex, never becoming an ally of its mate against the intruder. At my home, in the spring of 1935, an unmated male frequently trespassed on the territory of the "Old Pair" (mated since 1933) to court the female, but the mated male always drove him back to his own side of the lot. In April of another season, a female arrived and began singing as she perched about 20 feet up in a tree near our house. Immediately a mated pair flew to the tree, and that female flew at the singer, causing her to stop singing and leave, with the mated female in pursuit. In March and April, 1937, a female several times drove another from the vicinity of her nest while the male showed no animosity (Laskey, 1937:68). I have observed Mockingbirds

and Bluebirds in this same type of territorial defense. Brooks (Christy, 1942:185), however, reports a female Cardinal who during the breeding season was "often intolerant" of the presence of a male at the feeding shelf.

"Shadow-boxing" is occasionally practised by Cardinals of both sexes. An individual will fight its own reflection in a window pane for long periods on many successive days while the mate perches quietly in a nearby tree. W. R. Reed (1938:17) reports a female in east Tennessee flying at its reflection during January; she was sometimes accompanied by a male "which behaved as a bystander." In Nashville, a male spent much time in March dashing at his own image in a window while the female watched. Harry Yeatman (1936:22), of Columbia, Tennessee, reports a male that in winter drove all Cardinals from his territory and spent many hours in the day fighting his reflection in the upper windows of the house.

Cardinals, in Tennessee, are only mildly belligerent, and one seldom sees a fight involving them. Towhees, in my experience, fight oftener among themselves over food in winter, and Chipping Sparrows fight more desperately over territory in spring, than Cardinals do. However, in October, 1943, I saw two male Cardinals fly at each other, striking beaks as they came together three or four times. Again in December, a male ran at other males, striking one with his beak.

In my feeding program, food is widely scattered on the ground, hence the behavior would not exactly parallel that on a feeding shelf, where the food is concentrated in a small space. At her feeding shelf in Oklahoma, Mrs. Nice (1927:102; letter) found some of the males much more despotic than those which came to her shelf in Ohio. In all cases, the winter males dominated the females, but in Ohio she found the despotism mild. She tells me that "females in Ohio showed more animosity towards each other in connection with the feeding shelf than did males toward each other or toward the females. . . . In Oklahoma all males drove Harris Sparrows; some males drove all smaller birds. All gave way before Mockingbirds and a Robin." In winter, I find some Cardinals of both sexes drive off House Sparrows but usually ignore smaller birds (See also Maurice Brooks, quoted by Christy, 1942:185). They are sometimes dominated by Towhees, by Mockingbirds, and by Blue Jays.

The female of a pair tends to follow her mate after the breeding season and through the winter, but in autumn, males become mildly dominant when feeding, keeping the females in the background by running at them. The male of the Old Pair might run at his mate of three seasons if she came too close during November and December, and she remained a yard or so behind him as they fed on the lawn (See also Maurice Brooks, quoted by Christy, 1942:185). He was not seen feeding her until March, but in January and February, he permitted her to feed within a few inches of him.

Feeding of the female by the male, a common occurrence in March and April, is sometimes observed in January and February (Ganier, 1941:1), but usually starts in March. In 1936, Ganier's (1937:15) Cardinal, then 13 years of age, started feeding his mate in February. The female assumes the begging posture, quivering both wings like a juvenile bird. In the section on the nesting of "Y" and "B" in this paper, more details are given on the begging of a color-banded female. Feeding of the female gradually ceases as the young need attention and the male is occupied with them.

Nests and Nesting

Cardinals usually begin laying in April. A. F. Ganier (1941:2) states that his earliest record around Nashville is a completed set of 3 eggs on April 3, but I have five records of eggs laid in March, four of them from 1938, when a period of spring weather occurred unusually early. In 1935, three eggs were being incubated April 1; in 1938, a set of three was being incubated March 28 and three broods of two, one, and two, were banded on April 16, 18, 19, respectively, when they were at least five days old—indicating that egg laying started in March.

The nesting season may extend into August and September. I have 13 records of young still in the nest during those months. In addition, I have trapped from late September to December 14 a number of unbanded immatures whose beaks were still dark, an indication that they were August or September nestlings, since the beak assumes the red color of the adult in 65 to 80 days (though a dark tip about a millimeter in width is sometimes retained in the upper mandible for several months). On October 6, 1941, a young Cardinal three to four weeks old was still being fed in Centennial Park by the mother.

Since 1932 I have found a total of 103 Cardinal nests in the Nashville area. As nest sites, Cardinals choose young evergreens of many varieties; privet hedges; many species of vines, including rose and honeysuckle; shrubbery; and saplings of hackberry, elm, hawthorn, and locust. I have found them from 2½ to 12 feet from the ground, but 4 to 5 feet is the usual height. Shaver and Roberts (1930:167) report one 8 inches, and two 15 feet, from the ground. Most nests are concealed in forks of twigs and small branches or in mats of vine stems, but one at my home was built upon a platform of twigs which I had placed in a privet shrub where the pair had tried to anchor material in unsuitable forks. Another was built on the ledge of a lattice fence between poultry wire with nothing for concealment. Alfred Clebsch (1943:38) found one in Clarksville, Tennessee, in a rustic building behind some lattice work. Among 103 nests studied by Shaver and Roberts (1930: 160), two atypical sites were found which lacked the usual foliage concealment; one was placed on the north side of a house, and the other against the trunk of a honey locust tree on the branching thorns below the limbs. They cite one photographed by Harry Vaughn, of Nashville,

in April, 1921, which was placed on a dirt shelf among tree roots in a gully. E. Copeland (1936:83) describes a Cardinal nest built in a feeding shelf outside a second-story window.

Nests are composed most commonly of weed stems, small pliable twigs, strips of bark, grasses, vines, and rootlets, with leaves and paper interwoven. They are bowl-shaped, some compactly built and well-lined, others very flimsy with scarcely any lining.

I observed the building of three nests from the start; one was begun April 6, 1931, completed April 10, first egg laid April 16; one started April 1, 1934, was completed April 4, first egg laid April 9; another, started April 7, 1937, was completed by April 16 (perhaps earlier), and contained its first egg on April 22. The male assisted in building one nest; the females built the other two without help. Sometimes the male attends his mate as she flies back and forth with material. Ganier (1941:1) states the male sometimes brings material which the female takes from him. Sutton (1941:274) states that "Crousty" built her first nest in late June, 1937, when she was less than 11 months old. She built it by herself while the male sang and fed her. "The nest was a good one, neat, compact, well lined." She had been hand raised and released in the spring at Ithaca, New York, where she and her mate, a wild bird, were the only two Cardinals in the countryside. Shaver and Roberts (1930:163) also state nest building is usually by the female with the male sometimes accompanying her or singing in a nearby tree, but they observed two nests where the male assisted in building.

Shaver and Roberts (p. 157) report that a pair may build five nests in a season, though usually not more than four broods are reared successfully. In 1934, at my home, the Old Pair started nest building on April 1, and that season had four nests, three of which were successful; six young were raised. In 1935, the same female again had four nests, with three successful. The first brood of two left the nest April 22; the second nest was robbed. About that time, the male of the pair, now mated for three seasons, disappeared, and the female mated with the green-banded male ("G") that had occupied the other half of the lot, had courted her in spring, and had been chased back by her mate. She remained in her old territory where she and "G" had one nestling leave on June 11 and two on July 30. Her nesting routine had not been affected by the loss of her old mate and the acquisition of a new one in mid-season, for she raised that season five young from three successful nests in four attempts. A sixth nestling was killed by a Blue Jay the day its nest mate was fledged. (Laskey, 1935:62.)

The number of eggs in a set is commonly three, but in Oklahoma, Mrs. Nice (1931:173) found that among 36 nests with at least three eggs, 28 per cent had more than the usual complement: nine had four eggs, and one had five. Ganier (1941:2) states that around Nashville about one in 30 nests has four eggs and that late in the season a full complement may be two eggs. Christy (1942:182), in Pennsylvania,

in four nests studied, found one with four eggs. Excluding nests found with less than three eggs or young, which may or may not have been complete sets, I have records for 35 nests during the years 1937 to 1943. Of these, three had four eggs each (8.5 per cent).

In 1943 a set of three was completed April 16; incubating had started with the set still intact at 8:15 A.M. on the following day, but at 5 P.M. one pierced egg was found on the ground about four and a half feet away. A pair of Cowbirds had been lurking in a tree above the nest, but none of their eggs appeared in the nest, and no further depredations occurred there. In Johnson City, Tennessee, Robert B. Lyle (Woodring, 1932:38) found the first Cowbird eggs he had recorded from that area in April, 1932, in a nest of the Cardinal which contained three of its own and two eggs of the Cowbird. H. C.Monk (1936:33), when compiling a list of species parasitized by Cowbirds in the Nashville area over a period of 19 years, stated: "Local students have examined thousands of Cardinal nests with only one Cowbird record, indicating how very rarely this species is parasitised." This scarcity of records might be taken as evidence that the Cowbird is a rare breeder in Tennessee, as reported by Ganier (1933:39), but I have records for 1938 to 1942 of nine Cardinal nests with one Cowbird egg in each. In 1942, among 16 nests of this species, four in April and one in June were parasitized and contained less than the usual complement of Cardinal eggs. Previously I had found Cowbird eggs in two sets of three eggs and in one set of four eggs.

In one nest which I observed, the Cowbird egg hatched a day ahead of the single Cardinal egg, but both nestlings were taken by a predator. In another nest, the two Cardinal eggs and the Cowbird egg hatched on the same day. The Cardinals left at 9 days, but the Cowbird remained in the nest until 11 days old.

Incubation of eggs and brooding of young is by the female exclusively. In August, 1941, after I had removed two nestlings from a nest eight feet up in a privet hedge, the female hopped into the empty nest and sat in it, as if brooding, during the entire time the nestlings were being banded nearby. She was not deterred by the presence of the ladder or of the people.

I found incubation periods of 12 and 13 days, computed from the date of laying of the last egg, when incubation starts. Mrs. Nice (1931: 173) reports 12 days for nests in Oklahoma. The young may leave the nest at 7 to 11 days of age, but usually at 9 to 10 days.

During incubation, the male feeds the female, usually when she is off the nest. He brings food to the nest for nestlings and often assumes full charge of the fledglings when the female begins a new nest. He feeds the young until the next brood is hatched; then he repulses the older birds by flying at them with scolding notes. The last brood of the season is often divided between the pair for attention.

Although a large part of the food of adult Cardinals consists of

seeds and wild fruits, the nestlings are fed exclusively on insects. A hand raised Cardinal began to pick up food after 13 days out of the nest; another began after 20 days, at that time readily eating a corn-ear worm, first crushing the head, and passing it back and forth in its mouth a few times, before swallowing it head first. Cracking sunflower seeds was not successfully accomplished by "Reddie" until she was nine weeks old.

One hand-raised Cardinal dropped a pellet in the cage when brought indoors overnight at five to six weeks of age. The pellet was 15 mm. long, 8 mm. at its widest and tapering to a point, consisting of husks and seeds of millet. Among my hand-raised fledglings of other species, pellets were dropped by the Crow, Orchard Oriole, Mockingbird, and Bluebird.

Cardinals are not particularly fond of bathing, but "Reddie" (Laskey, 1937:68) bathed indoors occasionally; and on March 1, she took a prolonged bath, getting her plumage very wet, in a tiny gutter outdoors, with temperature around freezing and a light snow falling. One year in January, I observed Cardinals and Juncos bathing in small puddles formed by the melting snow. Christy (1942:177, note) states Cardinals are seldom seen at the bird bath; Mrs. Nice (1942: 187) says she has seen females bathe fairly often but knows of only one record for a male.

Nest of Y and B

In April, 1937, considerable data were accumulated from a nest of a resident color-banded pair built in the privet shrub by the house. The female, "Y," was banded in January, 1936, and was last trapped in June, 1939. Her mate, "B," was banded April 5, 1936, and was last seen in August, 1937. The nest was built six feet up, almost opposite a breakfast room window and under a high kitchen window.

Nest building started April 7; all material was brought in and placed by the female. Her mate followed her closely but was not seen assisting. The nest was complete by April 16 or earlier. That day the female was found in the nest at 7 A.M. (C.S.T.) but did not lay the first egg until April 22; the set of 3 was completed April 24, when incubation started. Fearing she might desert, I made no lengthy observations during incubation, but some notes were taken from spasmodic watching, as follows: April 26, "Female sings frequently, rather loudly, while incubating. Male sings from a distance of 150 feet. Songs alternate as if in answer." April 28, "Loud singing by female several times today, apparently to attract the male, for he answers. Her calls came shortly before she went off the nest. Male always met her at some distance from the nest. At several observations, she came back to nest, looked into it, left for short periods of a minute or so before settling." May 23, 6:25 A.M., "Male came to the nest with a moth. From perch on a twig

beside the nest, he passed it to the female, who left nest with it, flying to driveway curb 15 feet away to eat it. Male remained, hopping on twigs, looking into the nest while making soft clucking sounds. Female returned in five minutes, 'chipping.' She settled on eggs briefly, left, and returned immediately to incubate. Loud songs were given by her at 6:40, 6:45, 6:50 A.M. She flew off for 5 minutes at 7:15. She sang again at 7:35 A.M. The various Cardinal songs were used." May 4 (drizzling rain), 8:04 A.M., "Male called 'Woit, woit' several times. Female answered with same calls but fewer in number. Performance repeated.—8:16, Female off for 3 minutes, returning with 'chips,' leaving again before settling.—9:25 A.M., Off. Met male on driveway. Back in 2 minutes, looked at nest, flew off. Repeated, 'chipping' entire time. Settled at 9:35."

On May 7, the first nestling was hatched by 6:30 A.M. and the other two by 8 A.M. (13 days incubation). Young were seen raising heads within a half hour after hatching. Twice the female was noted eating egg shells; she turned and crushed the halves in her beak before swallowing. Apparently none was carried away. Observations were made during the nine days of nest care in periods irregular in length, and at varying hours of the day; yet they give a picture of the progressive phases of nest life. The first morning, the female alone fed the young, although during her short periods away from the nest the male may have given her food elsewhere. That afternoon he brought food to the nest, which he fed to the young in the absence of the female, but when she was at the nest she tended to monopolize this part of the care and begged the food from the male. Twice he passed it to her for feeding, but later in the day he ignored her begging and fed the young himself. On the second day (May 8) during mid-day observations, he brought food five times, and offered it to the young, but it apparently was unsuitable; some of it he ate himself and some the female swallowed. On May 10 (young three days old) both parents were kept so busy feeding that their visits alternated, each feeding in turn. May 11 the female was again seen begging the food from her mate. He gave it to her once but the other times ignored her. After that day no begging by the female was seen.

To feed the nestlings, the female perched on the nest rim, but the male was never seen on the nest. He always fed the nestlings from twigs adjacent to the nest. During the first days each parent announced its coming with the typical Cardinal "chip," but from the afternoon of May 11, when the nestlings were four days old, the parents were usually silent; the young had then become alert and were ready for the food at the arrival of a parent. On May 14, when the young were seven days old, their chattering food call was first heard. Each time a parent arrived in the shrub, the young stretched high in the nest and chattered. On May 15 they preened their breast- and wing-feathers. The entire body quivered in their eagerness for food from the parent.

At 7 A.M., May 16 (at nine days old), one was perching in the nest shrub, and by 8:30, the other two had joined it. During that day the parents spent much time in a nearby silver maple, where, from the low-sweeping branches, they obviously coaxed the young, trying to lure them away from the nest site. There were many trips from tree to shrub and back to tree, punctuated with "chips." Only a relatively few of these trips included feedings. At one time the female faced the young from the tree, singing "tu-er" repeatedly, changing to "de-ar bird," and back to "tu-er" again. Finally by 4:30 P.M. all three young had left the nest shrub; they were unable to fly, but they made their way across the front of the house, some 60 feet, to the privet shrub at the other side, where they spent the night. On June 10, the male was feeding three apparently full-sized immatures at the rear of the house; June 15 they were seen following him but not fed. June 19 and 25, one of the brood, a male, was taken in a banding trap near the house.

The nesting activities of the pair were not followed the rest of the season, but on July 23, the male was feeding a large immature of their final brood of the season. August 5, these adults were not far apart, the father feeding a dark-billed female and the mother followed by the immature male. Both these young had been caught in banding traps before this date, proving that they were already foraging to some extent for themselves. August 15, the adult male was busily repulsing two begging young by running at them, flipping his wings, and giving the short "pfitt, pfitt" scolding notes as they followed him with fluttering wings and jingling begging chatter.

In 16½ hours of observation of three young from hatching to the day before nest-leaving, the female fed the young 56 times, the male 45. In 6¼ hours during the first two days, the young were fed 3.3 times an hour; in 5½ hours during the next two days, 8 times an hour; in 3 hours on the fifth day, only 3 times an hour (this low figure being correlated with showery weather and much brooding), while in 1⅓ hours during the last two days, they were fed 11 times an hour. During the observation periods, the female brooded about two-thirds of the time during the first two days, about one-third during the next two, two-thirds on the showery fifth day and none at all after that during the daytime. The female gave the young their last feeding on the second day at 6:30 P.M. (C.S.T.) and on the third day at 6:53 P.M.; on both these evenings she settled for the night immediately after the feeding. On the third day she fed the young at 6:53 and settled at 6:55. On the seventh day she settled at 7:50.

Harvey (1903:56) says the parents feed the young insects at first by "regurgitation." My observations furnish no evidence to that effect; the insect food brought was often very tiny, but it obviously was carried in the mouth or beak and rolled many times in the beak before being fed to the nestlings.

Both parents cleaned the nest, but the female displayed more concern by waiting and searching for fecal sacs. She swallowed some until the fifth day and the male ate some until the fourth day; after that all were carried off.

Individual Range of Cardinals

A total of 1,621 Cardinals were banded at my home and in Nashville, and at several sub-stations (operated with the help of friends) [2] between September, 1931, and August, 1943. The records from these 12 years of systematic banding indicate that the Cardinal is not only a permanent resident species in the Nashville, Tennessee area, but also that individuals range no more than a few miles during their lifetime.

Eighty-five individuals, or 5.24 per cent of the total number banded, have been caught or found dead from one to six years after the banding date. Most of these birds were found in the immediate neighborhood of the banding place, and none was found farther than four miles away.

There are numerous records of banded individuals that remained in the same area for several years. Among them are a color-banded pair which remained as resident mates at my home for nearly three years, and a color-banded male that lived there from September, 1937, until killed by an automobile near our driveway in May, 1943. A male banded at my Love Hill sub-station in October, 1934, was caught in the same neighborhood in March, 1940. (Unfortunately, the finder removed the band before releasing the bird, so that further knowledge of this old bird is unobtainable.) In addition, there is the well-known male banded by A. F. Ganier (1937:15) at his home in February, 1924, and seen there regularly until its disappearance in November, 1936.

The greater number of my Cardinals have been banded in autumn and winter. From September into March, groups or loose flocks of from 6 to 25 birds gather at good feeding places. It became apparent during the second year of my banding (1932) and has been noted many times since that, while the total number of individuals in a given flock may remain fairly constant, the flock is not always composed of the same individuals (Laskey, 1934:117; Ganier, 1941:4). Throughout the season unbanded birds continue to arrive, and some banded birds disappear, often returning at some later date or subsequent winter season. These returning Cardinals reappear at irregular intervals. Their movements do not coincide with the rhythmic appearance and disappearance which my banding records have revealed for the Field Sparrow (*Spizella pusilla*), another species which has been considered a permanent resident (Laskey, 1934:172).

Among Cardinals, one plausible explanation of the fall grouping and wandering of a large part of the local population, while certain individuals and pairs remain on their nesting grounds, is that these

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[2] Grateful acknowledgment is made to M. S. Carter, A. F. Ganier, Mrs. E. C. Hicks, A. A. McMurray, M. L. Rippy, Jr., Mrs. E. C. Tompkins, and others.

groups are composed mostly of young birds hatched during the year (though the flocks doubtless also include adult birds that have left their breeding territories for various reasons such as lack of food and shelter). It is difficult in autumn after the molt to distinguish young from adult birds, but I have a few banding records as evidence. Several years ago I was operating sub-station "Shadows" at the home of Mrs. E. C. Hicks, three-quarters of a mile southwest of my home, and found that flocks congregated there each autumn and winter. They were attracted by the supply of hackberries and sunflower seeds, their favorite winter foods, and particularly by a dense canebrake about a tiny creek. Among the banded birds taken there, were some that had been banded as juveniles at their birthplaces. In February, 1933, I caught a male that had been banded in May, 1932, in a nest half a mile east; a female that had been banded in September, 1932, in a nest about two and a half miles north; and one unbanded male whose spotty plumage and short tail feathers indicated he was probably one of a very late 1932 brood. A young male, banded at my home in August, 1933, and retrapped there in September, was trapped at Shadows in November. In late December, 1935, another young male was taken at Shadows that had been banded in the nest of the Old Pair at my home. He had left the nest June 11, 1935. He had remained in our garden until he was at least six weeks old, for he was taken in banding traps July 8, 11, 12, and 13. In January, 1940, another male was trapped at Shadows that had been banded the previous August in immature plumage at my home and retaken there in December, 1939 (and that was again taken there in January, 1944). Therefore the Shadows flock had harbored at least six individuals that are positively identified as young birds, four of which are known to have hatched from one to two and a half miles away. Another young Cardinal with beak still dark was banded at the home of a friend in September, 1935, and was retaken on December 14 at my Love Hill sub-station about a mile from its birthplace.

Among my records are four which give an idea of the short distance traveled between birthplace and breeding area. Male No. 38-210161, banded in the nest at Glendale sub-station May 16, 1938, was trapped at my home station, less than a mile west, on July 7, 1938, February 23, 1939, and July 5, 1939. Female No. 37-240877, banded in the nest at Peabody Campus August 4, 1937, was found injured August 14, 1941, within a half-mile of the campus. Female No. 40-258298, banded in the nest August 6, 1941, was found dead in September, 1942, a quarter of a mile away. Male No. 41-217453, banded in the nest May 7, 1942, was found dead August 13, 1943, three-quarters of a mile southwest.

Dead Cardinals would not be easily overlooked by the public, yet not one of the 1,621 individuals banded in this area since 1931 has been reported except from the neighborhood of my banding stations.

In my experience there is no other bird that attacks the band as the Cardinal does. I have had to replace several tempered aluminum bands

that had been over-lapped by pressure from the beak of the wearer. An extraordinary example of the antipathy of a male toward his band which continued, at least spasmodically, over a period of two years, is described by J. B. Young (1941:197), of Kentucky. Mrs. Nice in Ohio and J. Van Tyne in Michigan each have evidence of at least one banded Cardinal that had removed the band. Although I have notched rectrices of numbers of my banded Cardinals—which would identify the individuals between molting seasons—none has yet been retaken without the band.

Ages of Banded Cardinals

Many of my birds have been retaken between the ages of two and three years but, disregarding those, the record shows that of the 1,135 individuals that at this time (1943) could have had a life span of three or more years, 30 birds, or 2.6 per cent, have lived three to six years. Age 3 years: 7 males, 5 females; age 3½ years: 1 male, 3 females; age 4 years: 3 males, 4 females; age 4½ years: 1 male, 1 female; age 5½ years: 3 males; age 6 years: 2 males.

Scott Hutcheson (1943:40) of Memphis, Tennessee, reports a banded male that nested near his home from 1939 to 1943, when it was found dead, at least five years old. Karl E. Bartel (1942:14), of Blue Island, Illinois, who had banded 73 Cardinals between 1935 and the end of 1941, states (p. 12) that his oldest living Cardinal is at least six years of age. Josselyn Van Tyne (1943:195) records a male in Michigan banded December, 1934, and still alive in August, 1943, at least nine years old. S. P. Baldwin banded an adult male Cardinal March 28, 1921, at Thomasville, Georgia, and captured it there in several successive seasons until February, 1930, when it was at least 10 years old (Lincoln 1933:86). M. S. Mercur (1937:122) had a female Cardinal in her garden in Pittsburgh, Pennsylvania, from the winter of 1927 until August, 1936, when it was found dead, at least 10 years old. Describing the old bird at the time of death, she states it "was disfigured by two bulbous growths, each more than half an inch through, that sprang from the base of the beak on either side and encroached both upon the nostrils and upon the eyes."

In Nashville, Tennessee, A. F. Ganier (1937:15) banded a male Cardinal in February, 1924, that lived to be at least 13½ years old (it was last seen in November, 1936). Ganier says: "When feeding at his shelf he does not stand erect . . . as do the younger Cardinals. Instead, he crouches or even sits down while eating. His head is held resting on his shoulders so constantly that when the neck is occasionally straightened, the feathers do not fall to cover the gap and a bare section of the neck is exposed. Molting has become slow and tedious; at this writing [November 10, 1936], there is still a ragged appearance on the upper breast." The Cardinal at the Ganier home mated and reared

young at that advanced age, but the female described by Mercur was deserted by her mate and apparently did not acquire another during her last season.

Weights

From 95 weights of Cardinals taken by Baldwin and Kendeigh (1938:438) in Ohio, the monthly averages show maximum weights prevail from October through April. In the records of 183 adults I took in Tennessee, maximum weights occurred from October through February. The loss in weight is correlated with the breeding season, which in our milder climate starts earlier in the year. Among the Ohio birds, the greatest weight, 50.3 grams, was recorded in January for the single female weighed that month; the lowest occurred in August, when seven females averaged 37.9 grams. In Tennessee, highest weights were also found in January, when 37 males averaged 48.4 grams; the lowest were in April, when 5 females averaged 39.3 grams; the average weight of 85 males was 45.1 grams, which is 2.1 grams greater than the average weight of 98 females, 43 grams.

Abnormalities

I have found Cardinals, both nestlings and adults, and their nests singularly free from ecto-parasites. Nests and individuals of many other species in the area, including the Mockingbird, Brown Thrasher, Catbird, Bluebird, and Towhee, have been found heavily infested with mites, mallophaga, and ticks, but I have found only one Cardinal with mites, a male about six weeks old, trapped in August, 1940. Mrs. Nice tells me by letter of a fledgling trapped in Ohio, which was heavily infested with mallophaga. Ruth H. Thomas (1941:591), of Arkansas, reports trapping three Cardinals parasitized by ticks. Bayard H. Christy (1942: 182) found one nest in Pennsylvania which contained maggots and pupae of *Protocalliphora*.

My Cardinals were almost immune to the foot and tarsus diseases found frequently in other fringillids, particularly Towhees, and Field and Chipping Sparrows. Four Cardinals had small, wart-like growths on toes. These were either removed or treated with iodine or mercurochrome. Two of these Cardinals were retrapped later with no trace of the affliction visible; the growths of one of these had been removed, the other had been treated with iodine. Two individuals had suffered tarsal injuries; one had an injured heel joint, the other, a broken tarsus, healed in an abnormal position, so that it was crooked and lumpy. Several had damaged mandibles, four of which appeared to have been caused by biting hard materials. Cardinals use their beaks, in moments of stress, to grasp with a vise-like grip (Laskey, 1934:115). When one is removing them from a banding trap, they grip the wires of the cage, and any bander will testify to the need of care in handling this

species to avoid painful pinching of fingers. The birds clamp the strong beak over the fingers in a grip that is difficult to unlock. This seems to be a fear reaction rather than a fighting gesture, for a small article placed in the bird's beak is often retained and the bander's hand ignored. An immature male had a deformed upper mandible, abnormally pointed at the tip, with a dark, thickened area at the base. The lower mandible of one male was marred by an injured spot measuring 8 by 3 millimeters. A female had the lower mandible abnormally short and, in the center, dark colored as if decaying. Another male had lost a large portion of the upper mandible. Two birds were trapped with slightly injured eyes, cause unknown. In summer, a male, blinded in one eye, was seen feeding on the ground. A tuft of dislodged head plumage indicated a possible attack by a predator.

Abnormal feather loss in a male Cardinal at least eight years old has been described by Van Tyne (1943:195). This bird lost all feathers from head and neck in June, and remained bald all summer but lived normally. In September he grew a complete set of head feathers in 28 days, remaining fully feathered, at least during the following ten and a half months. Van Tyne mentions a bald specimen from Texas, several in Ohio, and two of mine. Inadvertently, incomplete data were sent to him on my records. Instead of two cases of baldness among the 1,621 Cardinals banded, there are seven. One female had the head completely bald during August molt, normal in December; a female was bald, except for the crest on July 10—she was not retaken. A young female was reported from a sub-station with head bare on October 22 but was apparently normal in December. A male, banded in October with new plumage about complete, was retaken the following May with feathers missing from the right side of the head. He seemed very wild and bit frantically at my fingers. On June 11, he was completely bald and was still in that condition when retrapped July 14. His next recapture occurred in January, when his plumage was normal, though his beak was damaged at the edges. In two cases, some data have been gathered that may account for the feather loss. One male, while in a banding trap on November 13, was attacked by a cat through the wires, and received a scalp injury. When the bird was re-trapped a few days later, the wound appeared to be healed, but the bird was bald. A female was brought to me in late March with an injured wing. A week later, having regained some flight power, she was released. She was attacked and chased by a mated female on whose territory she trespassed. Two days later, she was found in another section of our place, partly bald. Apparently when Cardinals lose their head feathers prematurely through accident, they are not replaced until the normal season for plumage renewal in autumn.

No Cardinal with even a trace of albinism has been found among my birds, but Harry Yeatman (1942:18), of Mt. Pleasant, Tennessee,

reports seeing a partial albino in the winter of 1940. J. B. Loefer (1941: 44) lists one all white, and for Tennessee an albino female with two albino young, "all white except for a coral tinge to the wings." Maurice Brooks (1934:1) describes a partially melanistic male whose head, including the throat and nape of the neck, was "shiny blue-black" with one abnormally elongated red feather in the crest.

Summary

The Cardinal was studied in the Nashville, Tennessee, area from 1931 to 1943, a total of 1,621 individuals being banded.

Young Cardinals begin to sing a distinctive warbling song at three or four weeks of age, and use phrases of adult song at least by the age of two months.

Cardinals have at least 28 different songs, but male and female song are indistinguishable.

Cardinal song may sometimes be heard the year round, but full song for the male usually extends from February to September, and for the female, from March until July or August.

Whisper singing, antiphonal singing, and night singing are all common with Cardinals.

Cardinals begin late in February to take up territory and choose mates.

Each sex defends territory against intruders of its own sex, but Cardinals as a rule show little belligerence.

The female of a pair tends to follow her mate throughout the winter.

Males are mildly dominant over the females during the winter months.

The male feeds the female during courtship and the first nesting.

Nesting, as a rule, begins in April, sometimes in March, and frequently extends into September.

The nest is usually built by the female alone; all incubation and brooding is by the female; the male assists in feeding the young and in nest sanitation, taking full charge of fledglings when the female proceeds with another nesting.

Four nestings in a season are not uncommon.

The usual clutch is three eggs; eggs hatch 12 or 13 days after the last egg is laid; young leave the nest from 7 to 11 days, usually 9 or 10 days, after hatching.

There is some parasitism by Cowbirds.

Banding records indicate that individuals remain in the same garden for breeding and wintering for several years, and an individual rarely if ever wanders farther than four miles from its birthplace.

The winter groups or flocks (of 6 to 25 individuals) are apparently composed chiefly of young of the year.

Of 1,135 Cardinals whose life span could have been three or more years, 30 (2.6 per cent) have reached the ages of three to six years, the

oldest female being 4½ years old; two males reached the ages of six years. A male and a female 10 years of age and a male 13½ years are cited from the literature.

Weights of Tennessee birds are compared with those of Ohio birds.

Only one Cardinal was found with ecto-parasites; a few were found with injured beaks, feet or eyes; seven cases of baldness were recorded; no albinism or melanism was found.

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GRAYBAR LANE, NASHVILLE 4, TENNESSEE

GENERAL NOTES

The Greater and Lesser Yellow-legs as fish eaters.—That small fish form a food item acceptable to the Greater Yellow-legs (*Totanus melanoleucus*), has long been known. Peabody (1839), Bartsch (1899), Clark (1905), Danforth (1925), Bent (1927), Trautman (1940), Cottam (1943), and others have furnished convincing evidence that this species not infrequently eats minnows and other small fish. Whether the Lesser Yellow-legs (*Totanus flavipes*) has a similar inclination has seemed much less certain.

Most shore birds and a surprising number of land and tree birds occasionally eat fish. Milton B. Trautman wrote (letter, Dec. 1, 1943), that the Gizzard Shad (*Dorosoma cepedianum*) constituted the principal source of food of the Greater Yellow-legs at Buckeye Lake, Ohio; on only one occasion, however, did he find a Lesser Yellow-legs feeding on fish; and, away from Buckeye Lake, he only once found the Greater Yellow-legs feeding on fish. It was a question, therefore, whether the fish-eating habit of this species was primarily a local characteristic.

To determine whether this habit is local, common, or seasonal, and to ascertain the relative importance of fish in the diet of these two interesting shore birds, we have studied the food-habits records of the Fish and Wildlife Service. We found that 703 stomachs of the Greater, and 771 stomachs of the Lesser, Yellow-legs had been analyzed in the Service's laboratory at Washington, D.C. (now at the Patuxent Research Refuge, Bowie, Maryland). Percentages were based upon the standard volumetric or bulk method as outlined by Cottam (1936).

Since a bulletin on the food habits of our shore birds is expected to be prepared after the war, only the fish food is considered here. As might be expected, the fish consumed were usually of the small, sluggish, shallow-water species that are of little or no direct concern to the angler or to the commercial fisherman. Our studies further revealed that fish were taken at all seasons of the year, but, probably because of difference in availability, the degree to which the fish entered into the birds' diet varied in different localities and sections of the country.

It was surprising to discover that 419 (59.6 per cent) of the 703 Greater Yellow-legs had made all or part of their last meal on fish; 204 (29 per cent) had made their entire meal on fish; and 86 (12.2 per cent) had consumed fish to the extent of 75 to 99 per cent of the meal. Fish constituted approximately 44.5 per cent of the average meal of the total 703 birds and 74.6 per cent of the average meal of the 419 birds that had eaten fish during their last meal.

Of the 771 Lesser Yellow-legs, 142 (18.4 per cent) had made at least a part of their last meal on fish; 25 (3.2 per cent) had nothing but fish in their stomachs; and 54 (7 per cent) had fed on fish to the extent of 75 to 99 per cent of the meal. Fish constituted 10.6 per cent of the average meal of the 771 Lesser Yellow-legs and 57.5 per cent of the average meal of the 142 birds that had fed on fish during their last meal.

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C. C. Sperry and Clarence Cottam, *U. S. Fish and Wildlife Service.*

Golden Plover and Lapland Longspurs in southern Indiana.—On November 11, 1943, I observed a Golden Plover (*Pluvialis dominica*) in a large upland field at Walesboro, Bartholomew County, Indiana. It was in the company of Horned Larks and several Killdeers. The Plover, which was in winter plumage, alighted within 15 yards of me before circling and disappearing in the distance, where I believe it was joined by another. The characteristic two-syllabled whistle of the species was uttered at least six times. On the Falls of the Ohio River at Louisville, Kentucky, Golden Plovers have been occasionally seen in fall from September 3 to September 20, with one record for October 1 (*Kentucky Warbler*, 15:42). The occurrence of this example in mid-November, well after the first light snowfall in the area, seems worthy of note.

I visited the same field on November 13 and saw a scattered flock of some 65 Lapland Longspurs (*Calcarius lapponicus*), which I observed for over an hour. Years of search have failed to reveal these birds in the vicinity of Louisville, Kentucky, only sixty miles to the south. The Longspurs were very active and noisy, and showed little fear, sometimes allowing me to approach to within 20 feet.—Robert M. Mengel, *Glenview, Kentucky.*

An Ohio specimen of the Purple Sandpiper.—On November 29, 1943, while Kenneth H. Doan and I were visiting Starve Island, near South Bass Island, Ottawa County, Ohio, I saw a small bird alight at the water's edge. About twenty minutes later I found the bird, a Purple Sandpiper (*Erolia maritima*), feeding among the *Cladophora*-covered rocks, which had been recently exposed by the falling water level. I collected the sandpiper after observing it for several minutes. Presumably the bird had been feeding about the *Cladophora* from the time I saw it alight.

Since the species is chiefly maritime, I carefully examined its stomach contents. The gizzard and proventriculus were filled, principally with the remains of small algae, which Dr. Clarence E. Taft identified as belonging to one or more species of the genus *Ulothrix*. There were wing and thorax fragments from very small beetles; 158 bits of gravel, 0.4 to 3.0 mm. in greatest diameter and totaling 0.4 grams; an otolith of a fish, 4.2 mm. in diameter; a portion of the right pharyngeal arch of a cyprinid fish; and a few small fish scales. No algae of the genus *Cladophora* were found, although the sandpiper had been feeding among them; apparently the bird could separate the minute *Ulothrix* from the *Cladophora* without consuming the latter. The otolith and pharyngeal arch were probably eaten as grit, since the sandpiper was too small to have swallowed whole a fish of the size indicated, and I know of no instance of a shorebird tearing a fish apart to eat it. The bird was a male, weighed 76.90 grams, and was very fat. The skin is in the Ohio State Museum.—Milton B. Trautman, *F. T. Stone Laboratory, Ohio State University, Put-in-Bay, Ohio.*

First Hudsonian Chickadee for Ohio.—Turtle Island is a dot of land in Lake Erie about two miles off North Cape at the southeastern corner of Michigan. It is less than 100 yards in diameter but lies half in Ohio and half in Michigan. When I visited the island on November 6, 1943, my attention was caught by a peculiar note, which I traced to a brownish chickadee in the higher branches of the elms at the northern edge of the island. I returned to my canoe for a gun, and meanwhile, the bird moved to a patch of weeds on the southern, the Ohio part, of the island. Collected, the specimen was sent to the University of Michigan Museum of Zoology, where J. Van Tyne confirmed its identification as the Hudsonian Chickadee, *Penthestes hudsonicus hudsonicus*. This is, I believe, the first record of the species for the state of Ohio and the first specimen record for Michigan south of the Straits of Mackinac.—Harold Mayfield, *3311 Parkwood Avenue, Toledo, Ohio.*

Notes on birds of the Upper Peninsula of Michigan.—The following incidental observations of birds were made while I was investigating the status of Pinnated and Sharp-tailed Grouse in the Upper Peninsula of Michigan, from July, 1940, to December, 1941 (Michigan Federal Aid to Wildlife Restoration Project No. 5 R, under the auspices of the Michigan Department of Conservation and the Federal Fish and Wildlife Service). Approximately half of the total daylight hours during this period were spent in the field. Only those notes that are thought to be a definite contribution to the knowledge of Michigan's avifauna are included. Statements on the status of the various species are based on Josselyn Van Tyne, Check List of the Birds of Michigan (*Univ. Mich. Mus. Zool. Occ. Paper No.* 379, 1938); Leonard Wing, Birds of the Upper Peninsula of Michigan (*Res. Studies of the State College of Wash.*, 7, No. 4, 1939); and on the files of the University of Michigan Museum of Zoology.

Mallard, *Anas platyrhynchos*. Records of Mallards wintering in the Upper Peninsula are uncommon. With Conservation Officer Allan Tweedy, I saw a flock of six Mallards along an open creek about five miles south of Rapid River, Delta County, on February 21, 1941. Several times earlier in the winter, Tweedy had seen what he presumed to be the same flock at the same place.

Long-eared Owl, *Asio wilsonianus*. There are few Upper Peninsula records for this species. I saw a specimen at Dollarville, Luce County, on August 11, 1940, that had been shot about a week earlier, and on the evening of July 22, 1941, I saw a live Long-eared Owl at Shingleton, Alger County.

Northern Cliff Swallow, *Petrochelidon albifrons albifrons*. This swallow is a very rare and local summer resident. On June 3, 1941, I found a small colony of Cliff Swallows on a farm in Luce County (Sec.12, T.45N., R.11W.). There were four new, nearly completed nests under the eaves of the farmhouse.

Hudsonian Chickadee, *Penthestes hudsonicus hudsonicus*. Although this chickadee is considered a common transient and winter visitant in the Upper Peninsula, I noted it on only two occasions. In a small flock of chickadees seen on July 8, 1941, northeast of C.C.C. Camp Cusino (Sec.17, T.47N., R.16W.), Schoolcraft County, I definitely identified one bird as a Hudsonian Chickadee. There were possibly two of the species in the flock, but the birds were so active that I could not be certain. Later, on July 26, I saw two Hudsonian Chickadees about three miles northeast of Shingleton, Alger County.

Catbird, *Dumetella carolinensis*. The Catbird is known to be less common in the Upper Peninsula than in Lower Michigan, but it seems noteworthy that I saw and heard only one of the species while I was afield. I saw this individual just east of Shingleton, Alger County, on June 29, 1941.

Blue-headed Vireo, *Vireo solitarius solitarius*. I know of only one published nest record of the Blue-headed Vireo for the Upper Peninsula (Van Tyne, *Univ. Mich. Mus. Zool. Occ. Paper No.* 379, 1938:31). On June 22, 1941, I flushed an adult Blue-headed Vireo from a nest at Au Train Lake, Alger County. The nest was on the end of a maple branch, about 15 feet from the ground. It contained one egg.

Northern Parula Warbler, *Compsothlypis americana pusilla*. The nest of the Parula Warbler has not yet been found in Michigan. I heard the characteristic Parula song repeatedly for over an hour at a spot along the edge of a heavy evergreen forest at Au Train Lake, Alger County, on June 22, 1941. I saw the singing bird from a distance of only ten feet and definitely identified it as a male Parula Warbler.

Cape May Warbler, *Dendroica tigrina*. Although Lincoln ("The Migration of American Birds," 1939:88) included northern Michigan in the breeding range of the Cape May Warbler, there seems to be no definite breeding record for the state. Braund and Aldrich (*Ool.*, 58, 1941:99,103) recorded a number of these warblers in Luce County in June, 1940. After careful observation, I identified a male Cape May Warbler in a swamp northeast of C.C.C. Camp Cusino (Sec.17, T.47N.,

R.16W.), Schoolcraft County, on July 8, 1941. The bird was in view for five or six minutes, but it flew nervously about among the crowns of the tall spruce trees, making it difficult to obtain a good view. Finally it flew down to within about 30 feet of me, and I noted most of the identifying features; just before it flew out of sight I saw the white wing patches characteristic of the Cape May Warbler. Throughout this time the bird held a caterpillar in its beak. Previously, on June 23, 1941, I had made a similar observation at the same place, but on that occasion the bird in question had remained near the tops of the tall spruce trees, and I could not identify it with complete certainty. It also held something in its bill.

Connecticut Warbler, *Oporornis agilis*. I heard and observed a Connecticut Warbler at close range in a wet poplar woods adjacent to a meadow three miles east of Shingleton, Alger County, on July 1, 1941. The bird sang repeatedly from the same perch and allowed me to approach to within about 30 feet. The white eye ring, comparatively large bill, the light mandible, and the other characteristic features of a male of this species were clearly discernible with the aid of 8-power binoculars.

Brewer's Blackbird, *Euphagus cyanocephalus cyanocephalus*. There is apparently but one specimen record for Michigan of the Brewer's Blackbird, a female collected by Leonard Wing, near Ironwood, Gogebic County, on July 26, 1932, and sight records are extremely rare. I saw a pair of Brewer's Blackbirds southeast of Crystal Falls (Sec.7, T.42N., R.31W.), Iron County, on May 1, 1941. The birds alighted about 25 feet from the car, and with the aid of 8-power binoculars, I clearly saw the light iris and purplish head of the male, and the dark iris of the female.

Hoary Redpoll, *Acanthis hornemanni exilipes*. On March 25, 1941, two miles west of Creighton, Schoolcraft County, I saw a flock of eight redpolls that appeared strikingly light-colored in comparison with most of the redpolls seen during that winter. One or two in this flock (probably adult males) were extremely light, and their breasts were suffused with a delicate pink. I collected two of the flock, and P. Brodkorb identified them as *exilipes*. Only two earlier Michigan records of this form have been confirmed by specimens.

Alaskan Crossbill, *Loxia curvirostra minor*. In the winter of 1940–41 Crossbills were abundant in the Upper Peninsula from early November to February. Twenty-one specimens which I collected were identified by J. Van Tyne as the Alaskan form, following Griscom's revision of the species (*Proc. Bost. Soc. Nat. Hist.*, 41: 77–210). Many of these specimens were found dead on Highway 28, between Shingleton and Seney, Schoolcraft County, where they had apparently been attracted by salt or calcium phosphate on the road and been hit by cars. Manville (*Wils. Bull.*, 53, 1941:240–241) found crossbills common the same winter in the Huron Mountains, Marquette County, and found some specimens in breeding condition. The testes of two males I collected on January 29, 1941, were enlarged, averaging in greatest diameter 2.7 and 5.2 millimeters. Two females were collected on the same day, one with several ova 0.5 millimeter in diameter, the other with the largest ova 1.0 millimeter in diameter.—GEORGE ANDREW AMMANN, *Camp Carson, Colorado.*

Circulatory congestion as a possible factor regulating incubation behavior—It is generally assumed that periodic hunger is the chief factor regulating attentive-inattentive incubation behavior in birds. But other physiological factors, especially restriction of circulation and related discomfort, may have more to do with determining the length of the attentive period than hunger as such. Recent experimental work (*Ann. Rev. Physiol.*, 3, 1941: 343) has emphasized the importance of the activity of the skeletal muscles in maintaining blood flow in the veins, where the pressure is usually very low. When the body is at rest the action of gravity, reduced arterial pressure, and absence of the kneading action of the skeletal muscles

all tend to produce restriction of circulation, which eventually results in considerable discomfort. Even in sleep, periodic movements occur reflexively, a result, at least in part, of stimuli from congested regions. Jackson (*Science*, 96, 1942: 564) has recently shown that in the sleeping human being an anticipatory increase in heart rate occurs before a general movement. Stimulation of receptors by local congestion, pressure, and increased skin temperature is interpreted as bringing about a reflex acceleration of the heart rate before the impulses are strong enough to bring about activity of skeletal muscles and a change in position. In recording the heart rate of incubating birds on their natural nests (Odum, *Ecol. Mon.*, 11, 1941: 318) a similar anticipatory acceleration in heart rate, occurring just before the bird left the nest, was often noted. Indeed, when a quickening of the heart (readily detected by ear) occurred without apparent cause, it was usually safe to predict that the bird would leave the nest within the next few seconds to begin an inattentive period. If circulatory congestion, together with local pressures and heating of ventral skin areas in contact with eggs or nest, is the cause of these anticipatory responses, then we have an indirect indication that the bird may end an attentive period on the nest as a result of the discomfort produced by sitting still. Since the smaller the animal the more rapid the heat loss and circulation rate, we would expect circulatory congestion to be felt more quickly in small birds than in large ones during periods of inactivity. Correspondingly, the length of the attentive period is generally shorter in the smaller species.

One might inquire at this point as to the condition at night. Even though the incubating bird remains continuously on the nest, it does not necessarily remain still. In making records with passerines at night, I was much impressed with the amount of muscular activity which often occurred (Odum, *Ecol. Mon.*, 11, 1941: 318). Sometimes the bird even left the eggs for short periods to move to the edge of the nest or to the front of the nesting box.

Since activity on the nest may serve the same purpose in relieving discomfort as leaving the nest, and since anticipatory cardiac acceleration by no means occurred in my records at the end of every attentive period, it cannot be concluded that circulatory congestion with related discomfort is the sole regulator of attentive-inattentive behavior. Also, psychic factors cannot be ruled out; perhaps cardiac acceleration results from cerebral stimulation, that is, occurs when the bird thinks about leaving the nest (granting that it does think at all). The physiological basis here, as in other forms of behavior, is probably complex, and regulatory factors may well vary at different times or in different species.—Eugene P. Odum, *Department of Zoology, University of Georgia, Athens, Georgia.*

An unusual song from a House Wren.—The note by Edward S. Thomas (*Wils. Bull.*, 55, 1943: 192–193) on a wren which sang the songs of both the Bewick's and the House Wren reminded me of an odd song which I heard near Lexington, Virginia, on May 18, 1943, from a wren which I definitely identified as a House Wren (*Troglodytes aëdon*). At first, when the bird was singing in thick underbrush, I thought that the song might be coming from either a Carolina Wren or a Kentucky Warbler, for it was like that type of Carolina Wren's song which so much resembles the song of the Kentucky Warbler. Later, when a glimpse showed me that the singer was a wren, I thought that it was an unusual song of the Carolina Wren, but as I followed the bird, it came out into the open and sang from a tree, showing itself unmistakably to be a House Wren.

Phonetic rendering of bird sounds is notoriously unsatisfactory, but this song sounded clearly to me like the syllables, "turple, turple, turple, teer teer," with a heavy accent on the first "teer." This the wren sang again and again. Later it sang several times another two-part song, the first part of which was like the song of the Carolina Wren, the second being the normal rippling notes of the House Wren.—J. J. Murray, *6 White Street, Lexington, Virginia.*

Juvenile Cardinal helping at a nest.—Skutch (*Auk*, 52, 1935: 257–258) and Nice (*Trans. Linn. Soc. N.Y.*, 6, 1943: 79–80) have reviewed species in which young birds have been observed to help their parents feed later broods. In addition, Lack (*Auk*, 57, 1940: 173) records this behavior in the European Swallow (*Hirundo rustica*), Waterhouse (quoted in *Auk*, 57:277) reports it probable in the Variegated Wren (presumably *Malurus lamberti*), and Skutch (*Auk*, 57: 306–307) adds the Central American House Wren (*Troglodytes musculus*). Nice (p. 79) also reports help with nest sanitation given by juveniles of the Eastern Bluebird (*Sialia s. sialis*). Neither of these activities seems to have been recorded in the Cardinal (*Richmondena cardinalis*).

At a nest of Cardinals that I found on August 3, 1943, and watched through August 8, the day before the young left, a grown juvenile—possibly 2½ months old and apparently a female—on the morning of August 8 made three feedings and once carried something away. On the other hand, occasionally during my 14 hours of observation this bird begged food from both adults, alighting near them and, sometimes craning forward, *tih-tih*-ing with quivering wings; once it was fed by the male, and twice the female tried to drive it off. The adults were both color-banded birds, the juvenile helper was unbanded; identifications were always positive.

The juvenile was fed on the evening of August 5. The adult male had just reached the nest tree with a billful of food when the young bird alighted beside him and began to beg. Instead of going on to the nest, the male turned and gave his food to the juvenile. Three times on August 8 while the adult female was similarly en route to the nest with food, and once while she was still at the nest after completing a feeding, the juvenile likewise alighted in the tree and begged. Twice the female paid no attention. Of the two attacks that she made, one was not visible in detail because of foliage; in the other, she twice flew at the juvenile with feet thrust out, although apparently she did not actually strike. Neither of the attacks drove the young bird from the tree; after the one described, in fact, it went to the nest while the female was still there, took what seemed to be a dropping from the depths of the cup, and flew away with it.

On August 8, I watched the nest from dawn until noon. The juvenile made its feedings of the nestlings at 8:03, 8:09 and 9:16 o'clock. Each time its unbanded legs were clearly visible, and its juvenile calls confirmed its identity. On the first and third occasions it arrived at the nest alone; no food was actually visible, but the bird was plainly seen to thrust its bill into the mouths of nestlings. On the other occasion, the juvenile and the banded female alighted in the nest tree together, with food visible in the bill of each. The female went to the nest. While she was still engaged at her feeding the juvenile moved to the nest-rim 90 degrees to her right and also tried to feed. Its offering, however, was too large to dispose of; after several vain attempts, it tendered the food to the female, which took part of it and fed it to a nestling; whether the helper then also made a feeding or whether it ate the rest of the food itself I could not see. Curiously, the juvenile now reverted to its customary begging: during the appreciable time that both remained at the nest it held its open bill toward the female, called, and quivered its wings.

On June 6 I had seen a very short-tailed juvenile, whose age I estimated at 15 days, accompanying the color-banded male of this August nest. It is therefore possible that the helper was that bird or another member of the same earlier brood, and if so its age on August 8 was about 78 days. I supposed the bird to be a female since it showed no bright red in its plumage.—Hervey Brackbill, *3201 Carlisle Avenue, Baltimore 16, Maryland.*

EDITORIAL

We are very glad to be able to continue this year the custom of publishing a colored frontispiece to the annual volume of the *Bulletin*. The Plumbeous Kite, the subject of our 1944 plate, has not, we believe, been portrayed in color by any other modern artist.

The Club's endowment income, which the Council has authorized using for such additions to the *Bulletin*, would not alone be adequate to provide such a plate, but fortunately, a devoted and enthusiastic member has generously contributed the balance needed.

The healthy condition of the Club's treasury, described on a following page, is a tribute to our many loyal members who have continued their steady support, or even raised their class of membership, and to the hard, unremitting work of our faithful Treasurer. With such strong support your editors can face optimistically even a new year that holds prospects of shortages of paper, ink, and manuscripts.

Ornithological News

After completing twenty-five years service with the Canadian government, Hoyes Lloyd has retired from his position as Superintendent of Wildlife Protection for the National Parks Bureau, and will devote his time to ornithology and natural history work.

The North American Wildlife Conference will be held at the La Salle Hotel in Chicago on April 24, 25, and 26.

The Arcadia Sanctuary, developed at Northampton, Massachusetts, by LeRoy S. Combs, has been given by Zechariah Chafee, Jr. and his family to the Massachusetts Audubon Society for permanent preservation.

The U. S. Fish and Wildlife Service has published a revised list (Wildlife Leaflet 179) of the 275 National Wildlife Refuges, with an indication of the principal bird and mammal species found in each. The Service encourages the use of these areas for bird study and photography. Permits may be secured by writing the refuge manager.

OBITUARY

H. F. Witherby, long the leader in the study of British birds, died December 11, 1943, at the age of seventy. He founded and edited through thirty-seven volumes the excellent journal, "British Birds"; organized bird banding in England; and originated, partly wrote, edited, and published the world's best bird manual, "The Handbook of British Birds."

Charles H. Townsend, director of the New York Aquarium from 1902 to 1937, died January 28, 1944, in his eighty-fifth year. He was naturalist on the "Albatross" from 1886 to 1896 and published important papers on the birds of various Pacific islands. In 1901 he was elected a Member of the American Ornithologists' Union.

ORNITHOLOGICAL LITERATURE

THE SONG OF THE WOOD PEWEE (*Myiochanes virens* Linnaeus): A STUDY OF BIRD MUSIC. By Wallace Craig. New York State Museum Bulletin No. 334. Albany, 1943: 186 pp., 1 pl., 19 figs.

In this paper, which really amounts to a book, we have fulfillment of the promise made by the author in his five-page preliminary report published in *The Auk* in April, 1933. It gives us the basis for his previous generalizations and elaborates and clarifies them in such a way as to furnish a very impressive presentation of an exceedingly interesting thesis, while to many it will come as a revelation of the possibilities of the intensive study of bird song. It contains much new matter, and it covers more than the Wood Pewee's song, for thirty of its pages are devoted to bird song in general, and especially to its musicology. As the subtitle states, this is a study of bird music, and throughout the book the Wood Pewee's song is treated as music, as esthetic art, but from the scientific point of view, for of course music is a science as well as an art.

The data for this study were furnished by 22 trained observers who supplied in all 144 records of the morning twilight song and 17 of the evening song. These records were made by taking down the phrases as the bird uttered them, using a number for each of the regular phrases of the song—*1* and *2* for the two familiar gliding phrases, and *3* for the rhythmic phrase, which occurs only in the twilight singing.

As a brief summary we can say that this species has two types of singing—the leisurely singing heard only in the daytime and used for the territorial song, and the rapid rhythmic singing heard chiefly in the morning twilight but also to some extent in the evening. In the daytime singing only the two gliding phrases are used, and there are long rests between. The twilight song is rapid as well as rhythmical and shows a tendency to a 50 per cent prevalence of phrase *3*. The phrases of this song usually appear in the form of musical "sentences," of which the commonest is *3132*, a "satisfying" musical composition resembling in pattern a stanza of "Home, Sweet Home" or, as Henry Oldys pointed out forty years ago, "Swanee River." Though the author uses the word "composition" in describing the twilight song, it is not to be understood that the individual singer is a composer in the musical sense. It is the species that does the composing, and the composition comes into being through the existence of certain underlying tendencies that are musical in character, especially "the tendency to sing more *3*'s, the rhythmical phrase, when singing fast, and the tendency to regular recurrence of the *1*'s, *2*'s, and *3*'s." Dr. Craig believes that the structure of the song "cannot be explained wholly by any theory of external utility, such as the theory of territorialism or that of sexual selection." Though stating that nothing in his paper is intended to contradict the mechanistic interpretation of animal behavior, he believes that the singing of birds is not entirely unconscious and unintelligent, that while the Wood Pewee is singing one phrase he anticipates the next, that birds give attention to sound and sometimes choose one sound in preference to another, thus making a beginning in musical taste. He believes that a study of the Wood Pewee's song helps in the study of the evolution of esthetics in general and that the esthetic is related to organic growth.

The twilight song of the Wood Pewee is so different from the ordinary daytime manner of singing that it lends itself particularly well to study, and yet it is by no means unique among birds, for not only do some of the other flycatchers, notably the Eastern Kingbird and the Crested Flycatcher, possess well differentiated twilight songs, but many other birds have developed special manners of singing which they keep for early morning (and sometimes also for evening), such as the Tree Swallow and the Chipping Sparrow, while still others, like the Hylocichlae, sing so much more steadily in twilight hours when all diurnal birds are stationary that we must regard the twilight singing as fulfilling quite a different purpose

from that of either courtship or territorial defense. This purpose Dr. Craig regards as the satisfaction of the esthetic sense of the singer, and I am inclined to agree with him. Some years ago I called attention to the rhythmic cawing of the Crow in groups of short caws—two, threes, and singles—which could not be regarded as purely mechanical but seemed to give evidence of the possession of an esthetic sense (*Auk*, 36, 1919: 112–113). If so unmusical a bird as the Crow can take pleasure in rhythm, surely birds with the gift of song can sing from pure enjoyment of the sounds they produce.

We have, then, three uses for bird song, not simply two as we have been used to suppose. In addition to its use for attracting a mate and its use for proclaiming the holding of territory, we have the non-utilitarian use of satisfying a psychological need of the singer, for many of us will believe with Craig that it is not taking an anthropomorphic view of bird psychology to grant birds a glimmering of esthetic taste. And even this use, I should think, may not be strictly non-utilitarian, since it probably keeps the singer going on an even keel by supplying a means of catharsis for the emotions involved in the strenuous business of bringing up a family. This is not to say that such singing is in itself emotional, which, as Craig says, it does not appear to be.

What I have so far said relates more to the ultimate conclusions of Craig's study than to the study itself, which is chiefly occupied with the extensive minute detail of the analysis of the records of the Wood Pewee's twilight song. There is much of great interest in this study that could not be indicated without unduly extending this review. Indeed, the reader is surprised at the number of interesting corollaries that the study has brought out. I will take up only a few points.

In considering the evolution of the Eastern Wood Pewee's song the author finds some evidence that it originally resembled that of the Western Wood Pewee (*Myiochanes richardsoni*), which uses no phrase comparable with the No. 1 of *M. virens* but does have a slurred phrase resembling No. 2. He concludes that No. 2 is the older of the two common phrases phylogenetically and considers that that may account for the curious fact that it is the phrase with which it begins its song-day in the morning and ends it in the evening. He shows that the evening twilight song as a whole is a mirror image of the morning song.

There is also a very interesting discussion of the song day of the Wood Pewee, a discussion that would apply equally well to most of our song birds. The Pewee anticipates both daylight and nightfall by beginning his day before it is really light and ending it before it is really dark, just as migrating birds, by a physiological mechanism, anticipate the seasons. The song and other activities are governed by an internal mechanism. "Every animal and every plant is a chronometer."

In the discussion of bird song in general the author brings out some points that may be new to the reader. Among these is the importance of distance between breeding pairs in the development of song. The birds that have developed song to an important extent are those that breed at such a distance from others of their kind as to make song useful—neither so near as to make it unnecessary for communication nor so far as to make communication by sound impossible.

Imitation as a factor in bird song is discussed, and the author reviews the evidence for and against the theory that it plays a principal part. He finds the preponderance in favor of the theory that songs, as well as call-notes, are inherited, not acquired. As to the Wood Pewee, the observational evidence indicates that the song is uninfluenced by the singing of other birds of that or any other species. This applies both to the melody of each phrase and to the order of utterance. On the general subject, however, it is certain that the last word has not yet been written. Mrs. Nice in Part II of her "Studies in the Life History of the Song Sparrow" (1943) questions the complete validity of the conclusions reached by one of the authors whom Craig cites. Her own observations of the Song Sparrow led her to the conclusion that the main pattern of the song of that species is innate, that the quality is probably acquired by imitation, and that the particular songs

are more or less original with each individual. It would seem, therefore, that all three elements enter into the development of song—inheritance, imitation, and originality.

But in the space of this review it would be impossible to comment on everything the author has to say on the general subject of bird song. Some of the special topics treated illuminatingly are evolution of ability in singing, intelligent esthetic choice, contrast between birds and mammals, the material of bird music, the form of bird music, ranking of songbirds, the concept of bird song. Preceding the author's summary there is a section, "Problems for Future Study," in which good advice is given to young field observers.

This reviewer is not quite certain of some of the statements he finds in the paper. One of these is that on the correlation of the singing of the Wood Pewee's twilight song with the bird's respiration. On pages 54–55 we read: "Because of the continuity of the sound in the gliding phrases it seems necessary to assume that the entire phrase is sung with one expulsion of the breath. From this, and from other facts, we conclude, tentatively, that at the height of the rhythmic song the Pewee inhales and exhales only once for each phrase; his rate of singing is his rate of respiration.." Now, the fastest singing recorded averaged 32 phrases per minute, which I should think would be a very slow respiration rate for a Wood Pewee. According to Baldwin and Kendeigh in "Physiology of the Temperature of Birds" (1932) the Wood Pewee's average temperature was found to be 108°. They obtained no respiration rate for this species, but they found that the respiration rate of the Chipping Sparrow at a body temperature of 108° was 104 per minute, and the slowest rate they record at the same temperature is the Robin's of 74 per minute. There may be evidence with which I am not familiar that the Wood Pewee's respiration rate is considerably slower than that of other small birds, but Craig cites no authority for an assumption that such is the case.

I am not aware that the relation between respiration and song has ever been studied, and I suggest this as a subject for investigation by physiologists. How, for instance, can so small a bird as the Winter Wren pour forth for a period of eight seconds (A. A. Saunders in "A Guide to Bird Song") a continuous succession of warbles and trills without any apparent pause for breath? To return to the Wood Pewee, I find it impossible to account for the rate of singing on the supposition that it represents the normal rate of breathing, but an explanation of the facts is still to seek. Perhaps the time consumed by each gliding phrase is really considerably greater than the average time of all the phrases and the intermittent rests, and perhaps the bird takes several short breaths during each rest instead of only a single respiration, and thus by occasional very rapid respiration builds up a bank of oxygen upon which to draw. Or perhaps air stored in the air-sacs could be drawn upon without respiration; a considerable amount of air could be stored there for use in song. Another, though I think less probable, explanation might be that the syrinx is capable of producing sounds in inhalation as well as exhalation, so that birds might have the power of producing continuous sounds by complete respiration—aspiration following expiration without a hitch between—a feat that is difficult, if not impossible, for the human larynx to perform, though easy enough for the whistler.

Other things upon which I should not agree with Dr. Craig are largely matters of emphasis and opinion—as, for instance, I should attach much more importance to the role of the imitative factor in bird song than he does—but this is not the place for that kind of discussion. From my own point of view one of the most important contributions of the paper is the concept of the unemotional twilight song as belonging to an entirely different category from the courtship and territorial songs and from song as an emotional outlet and as a mere habit extended beyond its period of utility.

This seems to me a very important paper and one that is destined to influence profoundly the study of this most interesting phase of bird behavior.—Francis H. Allen.

WATERFOWL IN IOWA. By Jack W. and Mary R. Musgrove. Illustrated by Maynard F. Reece. State Conservation Commission, Des Moines, Iowa, 1943: 6 x 9 in., ix + 122 pp. 12 pls. (8 col.), 11 vignettes. $1.00.

For its cost, no bird guide offers more help in identifying game waterfowl than this little book, which has been prepared not as a scientific treatise but rather as an introduction to wild waterfowl. Six chapters briefly describe 37 Iowa species (2 swans, 6 geese, and 29 ducks)—which occur also in most of the central states. Four chapters discuss molts and special plumages, lead poisoning, enemies of waterfowl, and migration. The description of fall migration is a real contribution to waterfowl natural history.

The illustrations by Maynard F. Reece compare very favorably with more expensively reproduced work of well-known bird artists. The problem of necessary crowding on the plates has been satisfactorily met by varying the action and poses. With a few exceptions such as the diving ducks (whose bodies seem too long), the birds are well drawn. Unfortunately, the text and color plates do not always agree, and a few rather serious errors have crept in. For example, the "juvenile male" Red-breasted Merganser (pl. 8) has the *adult* wing, and actually is a second year or adult drake (in earlier molt than the adult drake figured just above). The "juvenile male" Redhead (pl. 5) is more like an adult female. The "juvenile" drakes of the Wood Duck, Ring-necked Duck, and American Golden-eye are not true juveniles in the "plumage succeeding the natal down"—to quote from the authors' glossary—but are shown well along in their post-juvenal molt into the first adult (nuptial) plumage. Of two dabblers shown "in eclipse," the Wood Duck is correct, but the Mallard erroneously shows traces of green head plumage and white neck-ring, which are regularly lost in full eclipse. Unfortunately, the text and illustrations present the two unproved subspecies of the Black Duck but omit all mention of plumage differences between the sexes. Actually the plate shows a pair (drake at left) rather than two races.

No mention is made of the double molt of females; but we are not surprised at this omission, considering the errors and gaps in the literature on waterfowl plumages. Crediting the Ring-necked Duck with a "soft, purring note" is to omit the very harsh, croaking notes it often utters.

Perhaps faulty color work, rather than artist's errors, is responsible for failure to show the light blue of the bills of the Ruddy and Buffle-head drakes and the pink band on the bill of the Old Squaw drake. The juvenile Snow and Blue geese are figured with pink, instead of grayish-black, bills and legs.

Nevertheless, the book will be very helpful to a great many people, especially to those who do not own the more detailed and more expensive Kortright manual. The Iowa State Conservation Commission, the authors, and artist are to be congratulated on the publication of this useful guide.—Miles D. Pirnie.

THE RAFT BOOK. By Harold Gatty. George Grady Press, 445 West 41st St., New York, 1943: 5½ x 7⅝ in., 149 pp. 29 pls. (2 col.), 2 folding maps. $3.25.

The destructive forces of modern war have made shipwreck so common that we have now a special book published for those about to be lost at sea. Harold Gatty, famous aerial circumnavigator of the globe, has used his knowledge of the remarkable native Polynesian methods of navigation to prepare a volume which will, he believes, enable even an untrained person without navigating instruments to find his way to land after being set adrift in a life boat.

To judge by his allotment of space, Gatty considers bird study second only to astronomical methods in value to the navigator forced to find his way at sea without instruments. The authenticity of Gatty's thirty-five pages and six plates devoted to birds will be instantly recognized by every bird student when he finds that the author's adviser was Robert Cushman Murphy, and his bird artist, Francis L. Jaques.

Gatty says that "birds have played a far greater part in the opening up of the world than is generally realized . . . A study of the tracks of the migration of land birds in the Pacific, and further consideration of the evolution of bird migration routes, shows that man's path in the Pacific has followed the paths of land birds. No people, whether primitive or civilized, would set out over thousands of miles of ocean without knowing that they were going to some land. The Polynesians, who were, like all primitives, close observers of nature, saw the land birds taking off year after year in the same direction, and knowing that they were not able to rest on the ocean, must certainly have realized that another land lay in that direction. What else would lead these seafaring people from Tahiti to New Zealand but the repeatedly observed migration of the Long-tailed Cuckoo between these two places?" (p. 6).

The scope of the ornithological part of the book is best indicated by the titles of the sections: Migratory Birds as Winged Pilots, Land Sighting Birds as Navigating Instruments, Land Indications from Seabirds, Birds of the Ocean and their Distribution.

The five Jaques plates figure sixty-six birds of forty-three species chosen as representative of the principal kinds of sea birds.

The book is published in two editions—one for shore use and a water-proofed edition reserved at present for use in lifeboats and rafts.

Anyone interested in the ocean and its birds will find fascinating and profitable reading in this very attractive little book.—J. Van Tyne.

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See also *Anatomy:* Petrides and Nestler; *Migration:* Lowery, Poor.

History, Biography, Bibliography, and Institutions

Brigham, Edward M., Jr. Norman A. Wood. *Jack-Pine Warbler*, 21, No. 4, Oct., 1943:103–108, pl. 11.

Dale, E. M. S. William Edwin Saunders. *Canad. Field-Nat.*, 57, No. 6, Sept., 1943:99–100, 1 pl.

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Wetmore, Alexander. Two More Fossil Hawks from the Miocene of Nebraska. *Condor*, 45, No. 6, Nov.-Dec., 1943:229–231, figs. 62–63.

Wilson Ornithological Club Library

The following gifts have been recently received:

A. E. Borell—8 reprints
Phil Goodrum—6 pamphlets and reprints
Joseph J. Hickey—1 reprint
Leon Kelso—4 pamphlets
George H. Lowery, Jr.—17 pamphlets
W. L. McAtee—14 reprints
E. A. McIlhenny—1 reprint
Howard L. Mendall—1 bulletin
Henry Meyer—1 reprint
Katie Roads—2 books, 8 journals
R. W. Sheppard—10 reprints
Dayton Stoner—2 reprints
M. G. Vaiden—4 reprints
Richard L. Weaver—3 reprints
J. M. Winterbottom—1 reprint

ANNUAL REPORTS

REPORT OF THE RETIRING TREASURER

Balance as shown by last report dated Dec. 31, 1942 ...$	334.48	
Receipts, Dec. 31, 1942 to Feb. 27, 1943		
Dues:		
Associate	125.50	
Active	76.50	
Sustaining	20.00	
Subscriptions to *The Wilson Bulletin*	87.25	
Sale of back numbers of *The Wilson Bulletin*	.50	
Miscellaneous receipts	3.15	
Total		$647.38
Disbursements		
Editor's expense: postage, mailing	16.20	
Treasurer's expense: express	.50	
Bank charges	1.20	
Bad checks returned	7.00	
Total disbursements		24.90
Balance turned over to new treasurer, Milton B. Trautman, Feb. 27, 1943		$622.48

ENDOWMENT FUND

Balance in savings account as shown by last report dated Dec. 31, 1942 ...$	815.05	
Interest on U. S. Postal Savings Coupon Bonds	9.75	
Total savings account		$ 824.80
Bonds at purchase value as shown by last report		2261.25
Total savings account, and bonds at purchase value, turned over to new treasurer, Milton B. Trautman, June 21, 1943		$3086.05

Respectfully submitted,

June 21, 1943 GUSTAV SWANSON, *retiring Treasurer*

REPORT OF THE TREASURER FOR 1943

Our financial status on January 1, 1944, appears satisfactory despite increasing printing costs and the slight decrease in membership. Our balance is considerably higher than last year.

Cash transferred from former treasurer Feb. 27, 1943 ...$	622.48	
Receipts Feb. 28, to Dec. 31, 1943		
Dues		
Associate	1303.81	
Active	1067.90	
Sustaining	231.40	
Subscriptions to *The Wilson Bulletin*	116.50	
Contributions	51.00	
Sale of back numbers of *The Wilson Bulletin*	40.75	
Miscellaneous Receipts	.75	

TOTAL RECEIPTS		$3,434.59
Disbursements:		
The *Wilson Bulletin:* printing, engraving, mailing	$2,332.13	
Editor's expense: postage, mailing, secretarial aid	142.22	
President's expense	2.50	
Secretary's expense: stationery, postage, clerical aid	62.77	
Treasurer's expense: postage, printing, clerical aid	142.60	
Membership Committee expense: postage, printing	131.22	
Bank charges	17.31	
Foreign exchanges	.96	
Bad checks returned	2.00	
Reprints	7.57	
TOTAL DISBURSEMENTS		$2,841.28
Balance on hand in Ohio National Bank, Columbus, Ohio, Dec. 31, 1943		$ 593.31

ENDOWMENT FUND

Cash balance transferred from former treasurer, June 21, 1943	$824.80		
Received by present treasurer Feb. 28 to Dec. 31, 1943:			
Interest on U. S. Postal Savings Coupon Bonds	9.75		
New Life Members	375.00		
Total receipts		$1,209.55	
Purchase of U. S. Savings Bonds, Series G., Sept. 1, 1943		1,000.00	
Balance in savings account, Ohio National Bank, Columbus, Ohio, Dec. 31, 1943			$ 209.55
Bonds on deposit in safety deposit box, Ohio National Bank, Columbus, Ohio			
U. S. Savings Bonds, Series G, purchased Sept. 1, 1943			$1,000.00
Bonds transferred from former treasurer:			
U. S. Postal Savings Coupon Bonds, dated July 1, 1935			780.00
U. S. Savings Bonds (maturity value May 31, 1945: $900.00), purchase value			675.00
U. S. Savings Bonds (maturity value Aug. 1, 1948: $1,075), purchase value			806.25
Total endowment fund			$3,470.80

Respectfully submitted,

December 31, 1943 MILTON B. TRAUTMAN, *Treasurer*

REPORT OF THE ILLUSTRATIONS COMMITTEE

The Illustrations Committee has aided the Editor in a limited way during the past year in securing photographs for reproduction in the *Bulletin*. Also, the chairman has acted in an advisory capacity regarding certain illustrations considered for use in the *Bulletin*. Richard Grossenheider, Karl Maslowski, and Roger T. Peterson of this Committee are now in the armed forces.

Respectfully submitted,

January 13, 1944 W. J. BRECKENRIDGE, *Chairman*

REPORT OF THE SECRETARY FOR 1943

The Wilson Club, despite a second straight year without a formal meeting of our members, has enjoyed a fairly prosperous and successful year during 1943. Our club year closes (as of December 1) with our rolls showing a membership of 1,028, a net loss for the year of 26 members. We lost from all causes during the year 169 members. New members received totaled 143, of whom 8 are Sustaining Members, 27 are Active and 108 Associates.

Our membership by classes is now distributed as follows: there are three living Founders; and we have 19 Life Members, 45 Sustaining Members, 334 Active Members, and 627 Associate Members.

Our success in maintaining a membership at very near the level of normal times must be credited in large part to the interest and devotion of our members, but a great amount of the credit must go to Richard L. Weaver and his active Membership Committee. The Secretary would like to take this official means of expressing to him and to his Committee the heartfelt thanks of the Wilson Club, and to wish for him the greatest success in his new work. The new Chairman of the Membership Committee, F. M. Baumgartner, is also commended to our members, actual and prospective, with the hope that his relations will be pleasant ones in his present capacity. Special thanks are also due to the men and women in the armed services who have devotedly maintained their Wilson Club membership.

The election of officers, conducted by mail again this year, has resulted as follows:

President: S. Charles Kendeigh
First Vice-President: Olin Sewall Pettingill, Jr.
Second Vice-President: Harrison F. Lewis
Secretary: Maurice G. Brooks
Treasurer: Milton B. Trautman
Councillors: Burt L. Monroe, Eugene P. Odum, Lawrence H. Walkinshaw.

Josselyn Van Tyne was re-elected Editor of *The Wilson Bulletin* by unanimous vote of the Council.

The Secretary wishes to thank the many officers and members of the Club for their continuing assistance to him, and to the organization. It is to be hoped that we may, by 1945, be able to resume our Annual Meetings, since many of us miss these pleasant contacts more, perhaps, than we had thought possible until we no longer had them.

Respectfully submitted,

March 1, 1944 — Maurice G. Brooks, *Secretary*

REPORT OF THE COMMITTEE ON AFFILIATED SOCIETIES

At its annual meeting last April the Wisconsin Society for Ornithology voted unanimously in favor of affiliation with the Wilson Club. We welcome them as our latest affiliate.

During the past year, accounts of the activities of the Inland Bird Banding Association, the Georgia Ornithological Society, the Virginia Ornithological Society, and the Wisconsin Society for Ornithology have been published in the *Wilson Bulletin*, and we hope that such news notes from affiliated societies may continue to appear in the *Bulletin*.

W. E. Scott has left to enter the armed services, and his successor as a member of the committee has not yet been named.

The committee asks for suggestions on ways in which affiliation can be made more active and vital.

Respectfully submitted,

January 18, 1944 — Gordon M. Meade, M.D., *Chairman*

REPORT OF THE LIBRARY COMMITTEE

During 1943 the Wilson Club Library received gifts of 18 books, 938 periodicals, 127 reprints, and 24 pamphlets. Among the books were five of Bent's *Life Histories*, raising the total of these to ten. Those lacking now are the *Diving Birds, Petrels and Pelicans, Marsh Birds*, and *Birds of Prey*, part 1. The largest single contribution was a collection of 725 copies of natural history magazines from Mr. R. M. Barnes, of Lacon, Illinois. The Library has at present about 145 books, 55 current periodicals, and 3,000 reprints and miscellaneous publications. For a fuller account see the September number of the *Bulletin* (pp. 208–211). There has been some increase in the use of the Library by members of the Club, but there is plenty of opportunity for greater use, and members are cordially invited to send for publications, or inquire about what is available. During the coming year we hope to publish a list of the periodicals currently received by the Library.

We wish to pay tribute to a former member of the Library Committee, Mr. Bayard H. Christy, whose death occurred last year.

Respectfully submitted,

February 29, 1944 HARRY W. HANN, *Chairman*

NEW LIFE MEMBER

LAWRENCE H. WALKINSHAW graduated from Olivet College and the University of Michigan Dental School and is a practicing dentist in Battle Creek. He began studying birds systematically in 1918, and his investigations of bird life histories have since taken him to Tennessee, Florida, Mississippi, Utah, Oregon, Idaho, and Alberta. The resulting publications have contributed greatly to our knowledge of the Field Sparrow, Prothonotary Warbler, and other species. At present he is working on a monograph on the Sandhill Crane. He is a Member of the A.O.U. and is on the Council of the Wilson Club.

THE WILSON BULLETIN PUBLICATION DATES

The actual dates of publication of the four numbers in 1943 were: March 23, June 25, September 28, December 28.

TO OUR CONTRIBUTORS

Our members are asked to submit articles for publication in the *Bulletin*. Manuscripts will be accepted with the understanding that they have not been published or accepted for publication elsewhere.

MANUSCRIPT. Manuscripts should be typed on paper of good quality and of letter size (8½ x 11). Write on one side only and use double spacing. The title should be brief and carefully constructed so as to indicate the subject clearly. Ordinarily the scientific names of the birds treated should be given and should appear early in the article. Most articles should have a brief summary at the end.

BIBLIOGRAPHY. Literature referred to in the text should be cited by author's name, year of publication, and exact pages of the particular reference. Such citations should ordinarily be listed in full at the end of the paper.

ILLUSTRATIONS. Photographic prints, to reproduce well as half-tones, should have good contrast and detail. Please send prints unmounted, and attach to each print a brief but adequate legend. Do not write heavily on the backs of photographs.

PROOF. Galley proof will be submitted to authors and must be returned promptly. Expensive alterations in copy after the type has been set must be charged to the author.

REPRINTS. The Club is unable to furnish free reprints to authors. Arrangements will be made, however, for reprints to be made at cost. A scale of costs, based on the number of pages, is given below.

REPRINT SCHEDULE OF THE WILSON BULLETIN

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